SONY

EDITING CONTROL UNIT

RM-450A

SERVICE MANUAL

1st Edition

⚠ WARNING

This manual is intended for qualified service personnel only.
To reduce the risk of electric shock, fire or injury, do not perform any servicing other than that contained in the operating instructions unless you are qualified to do so. Refer all servicing to qualified service personnel.

⚠ 警告

このマニュアルは，サービス専用です。
お客様が，このマニュアルに記載された設置や保守，点検，修理などを行うと感電や火災，人身事故につながることがあります。
危険をさけるため，サービストレーニングを受けた技術者のみご使用下さい。

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3-862-609-11(1)

Editing Control Unit

Operating Instructions Page 2

EN

RM-450A

SECTION 1
OPERATING INSTRUCTIONS

This section is extracted from operation manual.

Owner's Record

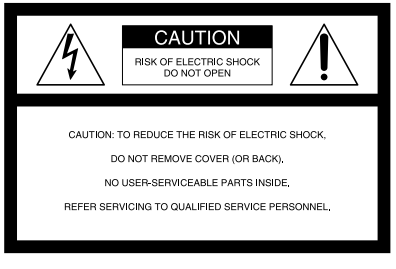
The model and serial numbers are located on the rear panel of the RM-450A. Record the serial nubmers in the space provided below. Refer to them whenever you call upon your Sony dealer regarding the product.

Model No. RM-450A Serial No. _____

WARNING

To prevent fire or shock hazard, do not expose the unit to rain or moisture.

For the customers in the USA


CAUTION
RISK OF ELECTRIC SHOCK
DO NOT OPEN
CAUTION: TO REDUCE THE RISK OF ELECTRIC SHOCK,
DO NOT REMOVE COVER (OR BACK),
NO USER-SERVICEABLE PARTS INSIDE,
REFER SERVICING TO QUALIFIED SERVICE PERSONNEL.

This symbol is intended to alert the user to the presence of uninsulated "dangerous voltage" with the product's enclosure that may be of sufficient magnitude to constitute a risk of electric shock to persons.

This symbol is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the appliance.

WARNING

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

You are cautioned that any changes or modifications not expressly approved in this manual could void your authority to operate this equipment.

The shielded interface cable recommended in this manual must be used with this equipment in order to comply with the limits for a digital device pursuant to Subpart B of Part 15 of FCC Rules.

For the customers in Canada

This Class A digital apparatus meets all requirements of the Canadian Interference-Causing Equipment.

NOTICE FOR THE CUSTOMERS IN THE UNITED KINGDOM

WARNING
THIS APPARATUS MUST BE EARTHED.

IMPORTANT

The wires in this mains lead are coloured in accordance with the following code:

Green-and-yellow: Earth
Blue: Neutral
Brown: Live

As the colours of the wires in the mains lead of this apparatus may not correspond with the coloured markings identifying the terminals in your plug proceed as follows:
The wire which is coloured green-and-yellow must be connected to the terminal in the plug which is marked by the letter E or by the safety earth symbol ⏚ or coloured green or green-and-yellow.
The wire which is coloured blue must be connected to the terminal which is marked with the letter N or coloured black.
The wire which is coloured brown must be connected to the terminal which is marked with the letter L or coloured red.

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Features

VTRs connectable to the unit
A 9-pin remote control connector is provided.
It is possible to connect the following VTRs.

U-matic VTR	VO-9850/9850P, BVU-800/900 series
Hi 8 VTR	EVO-9850/9850P
S-VHS VTR	SVO-5800/5800P
Betacam SP VTR	UVW series, BVW series, PVW series
DVCAM VTR	DSR series

CTL/time code/RTC (relative time code) selection
You can select a CTL signal, time code or RTC (relative time code) for editing. When RTC is selected, the time code is used as an edit reference and its progress is counted as CTL on the time counter. RTC can be used to determine how far the desired tape point is from the IN point as it can be reset in the same manner as a CTL.

Pinch on delay time learning capability
The unit can detect the pinch on delay time of the connected VTR and hold this data for a week even after the power is turned off. Therefore, the operation with the connected VTRs is very smooth and no discontinuity of the picture is produced by this unit.

Various edit functions
In the assemble mode, the video signal and audio signals (A1 and A2) are edited together at the same time.
In the insert edit mode, they can be edited separately. The unit can also perform the split edit. Therefore, you can set the audio IN point independently from that of the video channel and vice versa.
Materials you are to edit can be previewed and those that you have edited already can be reviewed.

Easy data pre-setting
You can easily preset various data, such as the preroll time and the edit timing, needed for editing on the front panel.

Quick tape access to the scene to edit
Variable speed of playback functions in the shuttle mode and jog mode enable you to locate the edit point more quickly.

Synchronization with the connected VTR
The REF.VIDEO IN connector allows the unit to synchronize with the connected VTR. Therefore, the unit can perform absolutely precise editing.

Control of the VTR with the dynamic tracking™ function
When the VTR which has the dynamic tracking function is connected to this unit as the player VTR, this unit can edit the picture in the variable speed.

Error indications
The unit indicates the error by displaying the error number on the time counter and outputting a warning sound. You can understand right away what kind of error has occurred and what you should do.

Rack mountable
The unit can be mounted on the RMM-450 rack mount metal which is designed for a standard 19-inch rack, and on the SU-500 series system console by using the SU-450 double size table.

Precautions

On safety
- Operate the unit only with a power source specified in the “Specifications” on page 32.
- Should any solid object or liquid fall into the cabinet, unplug the unit and have it checked by qualified personnel before operating it any further.
- Unplug the unit from the wall outlet if it is not to be used for an extended period of time. To disconnect the cord, pull it only by the plug. Never pull the cord itself.

On installation
- Do not install the unit near a heat source such as a radiator or an air duct, or in a place subject to direct sunlight, excessive dust, mechanical vibration or shock.
- Keep the unit away from equipment with strong magnets as for example a large loudspeaker.

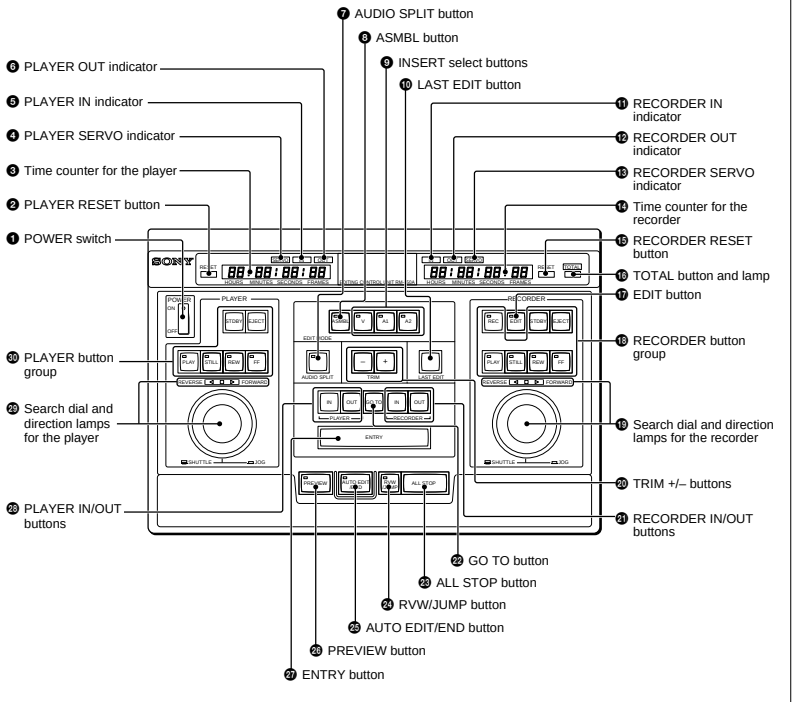
On cleaning
Clean the cabinet, panel and controls with a dry soft cloth, or a soft cloth lightly moistened with a mild detergent solution. Do not use any type of solvent, such as alcohol or benzine, which might damage the finish.

On transportation
Save the original carton and associated packing material. They will be useful should you have to transport or ship the unit.

If you have any questions about this unit, contact your Sony dealer.

Location and Function of Parts and Controls

Control Panel


❼ AUDIO SPLIT button
❽ ASMBL button
❾ INSERT select buttons
❿ LAST EDIT button
❻ PLAYER OUT indicator
❺ PLAYER IN indicator
❹ PLAYER SERVO indicator
❸ Time counter for the player
❷ PLAYER RESET button
❶ POWER switch
⓫ RECORDER IN indicator
⓬ RECORDER OUT indicator
⓭ RECORDER SERVO indicator
⓮ Time counter for the recorder
⓯ RECORDER RESET button
⓰ TOTAL button and lamp
⓱ EDIT button
⓲ RECORDER button group
⓴ PLAYER button group
㉙ Search dial and direction lamps for the player
㉙ Search dial and direction lamps for the recorder
㉑ TRIM +/– buttons
㉘ PLAYER IN/OUT buttons
㉑ RECORDER IN/OUT buttons
㉒ GO TO button
㉓ ALL STOP button
㉔ RVW/JUMP button
㉕ AUTO EDIT/END button
㉖ PREVIEW button
㉗ ENTRY button

❶ POWER switch
ON: Set to this position to turn on the power.
OFF: Set to this position to turn off the power.

❷ PLAYER RESET button
Press this button to reset the time counter and the entered edit points.

❸ Time counter for the player
The unit counts the CTL pulses or time code on the tape of the player and displays the result in hours, minutes, seconds and frames.
Error messages are also displayed here when errors occur.

❹ PLAYER SERVO indicator
This indicator lights when the servo-mechanisms of the player are not locked during the automatic editing and preview operation.

❺ PLAYER IN indicator
When the IN point of the player VTR is entered, this indicator lights.

❻ PLAYER OUT indicator
When the OUT point of the player is entered, this indicator lights.

❼ AUDIO SPLIT button **(See page 26.)**
Press this button and make it light to enter the audio IN point during the split editing.

❽ ASMBL (Assemble) button **(See page 15.)**
Press this button for assemble editing.

❾ INSERT select buttons **(See page 15.)**
These buttons select the input signal during insert editing.
V1: Video
A1: Audio Channel 1
A2: Audio Channel 2

❿ LAST EDIT button **(See page 19.)**
This button recalls the previous edit points on the time counter.

⓫ RECORDER IN indicator

⓬ RECORDER OUT indicator

⓭ RECORDER SERVO indicator
The indicator lights to indicate that servo is not locked during auto edit, preview or review operation.

⓮ Time counter for the recorder

⓯ RECORDER RESET button

⓰ TOTAL button and lamp
The lamp blinks when the button is pressed. Then press the RECORDER RESET button to reset the time counter of the recorder to 00:00:00:00, so that you can know the tape running time from after that point.

⓱ EDIT button
For manual editing, press this button and the PLAY button simultaneously. When only this button is pressed, the picture from the player will be monitored on the recorder monitor.

⓲ RECORDER button group
The function of these buttons is the same as those on the recorder VTR.
REC (Record) button
STDBY (Standby) button: This button makes the VTR shift to the standby off (stop) mode only.
EJECT button
PLAY button
STILL button
REW (Rewind) button
FF (Fast Forward) button

⓳ Search dial and direction lamps for the recorder **(See page 16.)**
This dial enables you to locate edit points. Push in to change from the shuttle mode to the jog mode and push it again to return to the shuttle mode.

⓴ TRIM +/– buttons **(See page 19.)**
Hold this button down while pressing the IN or OUT button to change the edit points frame by frame.

㉑ RECORDER IN/OUT buttons
Press either button with the ENTRY button simultaneously to enter the IN or OUT point for the recorder.

㉒ GO TO button **(See page 19.)**
Press this button with the IN or OUT button to locate the IN or OUT point.

㉓ ALL STOP button
Press this button to stop the tape of the recorder and the player.

㉔ RVW(Review)/JUMP button **(See page 22.)**
Press this button to review the edited picture.
Only the recorder operates in the same manner as during editing. Press the button during review operation to locate the OUT point of the recorder.

㉕ AUTO EDIT/END button
Press this button to set the recorder in the automatic edit mode. When you press this button during editing, the unit regards the tape point where you pressed this button as the OUT point, and finishes editing.

㉘ PREVIEW button **(See page 20.)**
This button is used for editing rehearsal. The picture you are to edit can be monitored before actual editing.

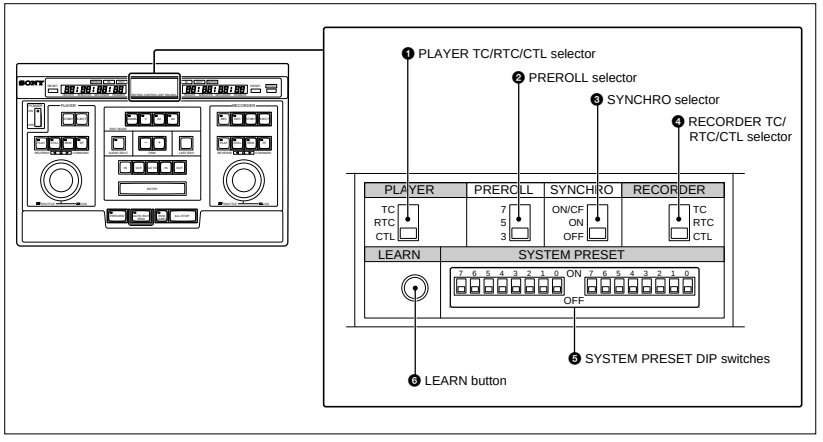
㉗ ENTRY button
Press this button with the IN or OUT button to enter the IN or OUT point.

㉘ PLAYER IN/OUT buttons

㉙ Search dial and direction lamps for the player **(See page 16.)**

㉚ PLAYER button group
The function of these buttons is the same as those on the player VTR.
STDBY (Standby) button: This button makes the VTR shift to the standby off (stop) mode only.
EJECT button
PLAY button
STILL button
REW (Rewind) button
FF (Fast Forward) button

Inside Panel



❶ PLAYER TC/RTC/CTL selector
Selects the time data displayed in hours, minutes, seconds and frames on the respective time counter.
TC: Time code
RTC: RTC (Relative Time Code), which is counted as a time code, but can be displayed like CTL.
CTL: Time period of tape travel by counting CTL pulses.

❷ PREROLL selector **(See page 21.)**
Selects the preroll time: 3, 5, 7 (10) seconds.

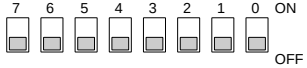
Preroll time selection
When you set the PREROLL selector to 7, the actual preroll time depends on bit 7 of the left SYSTEM PRESET DIP switches on the inside panel.

❸ SYNCHRO (Synchronization) selector
Selects the way to synchronize by frame pulse.
ON/CF: This unit counts color frames to synchronize the player and the recorder.
ON: Synchronizes the recorder and the player regardless of the color frame.
OFF: Does not control synchronization.

❹ RECORDER TC/RTC/CTL selector

❺ SYSTEM PRESET DIP switches
The default settings are all OFF (0) except for bit 7 of the right DIP switches as illustrated. For the U.S.A. model, bit 7 is set to OFF, and for the European model, bit 7 is set to ON.

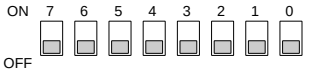
Left side



Bit	Meaning
7	Maximum preroll time is set. When this bit is set to ON, the preroll time is set to 10 seconds even though the PREROLL selector is set to 7 seconds. ON: 10 sec. OFF: 7 sec.
6	The entry of the edit point resets the time counter to 00:00:00:00 automatically. This bit is available when CTL or RTC is selected with the TC/RTC/CTL selector. ON: The time counter is set to 00:00:00:00 when the first edit point is entered. OFF: No automatic reset.
5	The beep sounds when any key is pressed or when the tape passes the edit points during preview or automatic editing. ON: The beep sounds. OFF: No beep sound.
4	Set this switch to OFF.
3	Where to output the CUE signal is selected. ON: The CUE signal is output after the IN point. OFF: The CUE signal is output before the IN point.
2, 1, 0	CUE OUT start position is set. These bits determine when the CUE signal is output after/before the IN point: 0 to 7 seconds. (0: OFF 1: ON) 000: 0 sec. 001: 1 sec. 010: 2 sec. 011: 3 sec. 100: 4 sec. 101: 5 sec. 110: 6 sec. 111: 7 sec.[a]

a) When bit 7 of the left DIP switches is set to ON, 10 sec. is selected as the CUE OUT start position.

Right side

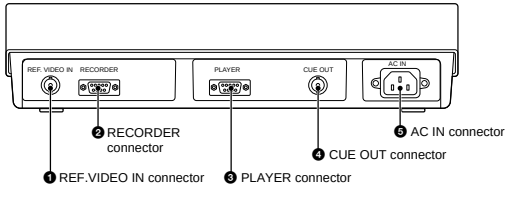


Bit	Meaning
7	Signal standard is set. ON: PAL or SECAM system VTR OFF: NTSC or PAL-M system VTR
6	CTL display mode is selected. This bit setting is available only when you set the RECORDER and PLAYER TC/RTC/CTL selectors to CTL or RTC. ON: The time data is displayed between 00:00:00:00 and 23:59:59:24. OFF: The time data is displayed between –9:59:59:24 and +9:59:59:24.
5	The operation after the servo-mechanisms cannot be locked is selected. ON: Even though the unit failed to servo-lock, it begins editing. OFF: The unit does not begin editing until the servo-mechanisms are locked.
4	The operation after the unit fails in synchronizing the recorder with the player is selected. When you set the SYNCHRO selector to ON or ON/CF, this setting is available. ON: The unit will synchronize again with the accuracy of no frame slipping. When it finally cannot, the unit does not begin editing. OFF: Even if the recorder is not synchronized with the player, the editing begins.
3	Synchronization begins depending on the player's or recorder's operation. ON: Player (The time base corrector must be installed in the player.) OFF: Recorder
2, 1, 0	These bits determine the edit timing during editing between –1 and –7 frames. (0: OFF 1: ON) 000: The edit timing is automatically detected. When the error whose number is 11 occurred, select another one. 001: –1 frames 010: -2 frames 011: –3 frames 100: –4 frames 101: –5 frames 110: –6 frames 111: –7 frames

❻ LEARN button
Press the button to detect the pinch on delay time of the connected VTRs after turning on the unit.

Location and Function of Parts and Controls

Connector Panel



❶ REF.VIDEO IN (reference video signal input) connector (BNC type)
Supply the reference signal to this connector.

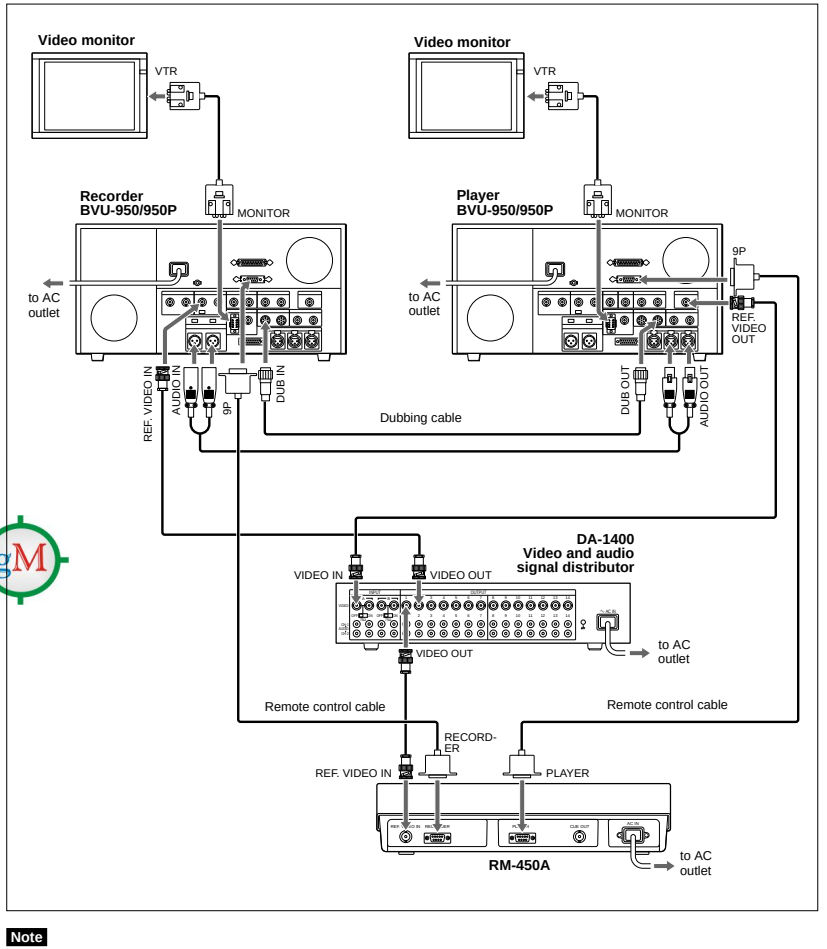
❷ RECORDER connector (9-pin)
Connect to the 9-pin remote connector of the recorder with an optional remote control cable.

❸ PLAYER connector (9-pin)
Connect to the 9-pin remote connector of the player with an optional remote control cable.

❹ CUE OUT connector (BNC type)
The output signal from this connector can be used as a tally signal.

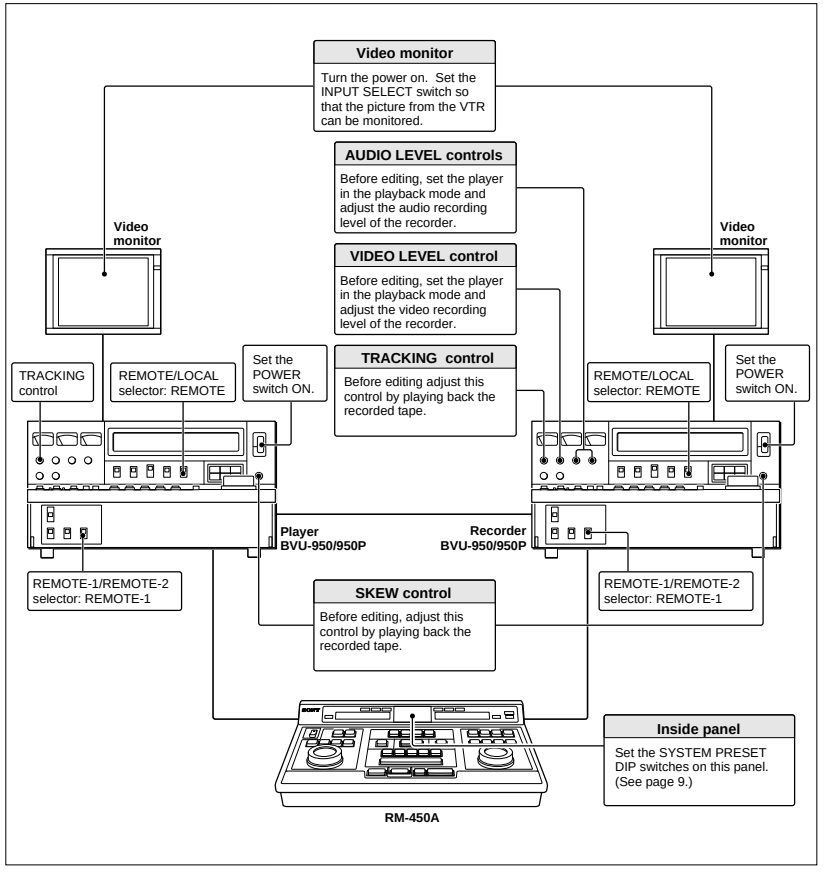
❺ AC IN connector
Connect to the AC outlet with the supplied AC power cable.

Connections



Note
Any signal cannot be output through the REF. VIDEO OUT connector when the BKU-903A digital time base corrector (option) is not installed in the BVU-950/950P VTR.

Preparation for Editing


Video monitor
Turn the power on. Set the INPUT SELECT switch so that the picture from the VTR can be monitored.
AUDIO LEVEL controls
Before editing, set the player in the playback mode and adjust the audio recording level of the recorder.
VIDEO LEVEL control
Before editing, set the player in the playback mode and adjust the video recording level of the recorder.
TRACKING control
Before editing adjust this control by playing back the recorded tape.
Video monitor
Video monitor
TRACKING control
REMOTE/LOCAL selector: REMOTE
Set the POWER switch ON.
REMOTE/LOCAL selector: REMOTE
Set the POWER switch ON.
Player BVU-950/950P
Recorder BVU-950/950P
REMOTE-1/REMOTE-2 selector: REMOTE-1
REMOTE-1/REMOTE-2 selector: REMOTE-1
SKEW control
Before editing, adjust this control by playing back the recorded tape.
Inside panel
Set the SYSTEM PRESET DIP switches on this panel. (See page 9.)
RM-450A

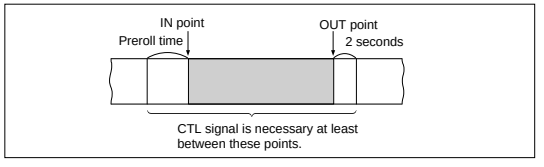
When the VTR having an internal time code generator, such as BVW-40/40P, is connected, set the switches as follows:

EXT/INT: INT
SLAVE LOCK/PRESET: PRESET
FREE RUN/REC RUN: FREE RUN

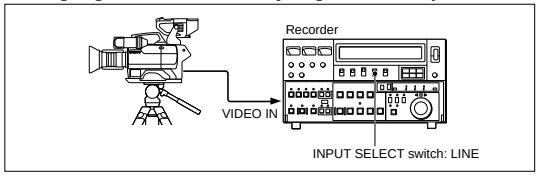
When the VTR having a function to read a VITC is connected, set the switch as it can read both a VITC and a LTC. (If the VTR has a VITC/AUTO selector, set the selector to AUTO.)

Insert edit using a new tape

A CTL signal must be recorded on the tape to be recorded as indicated on the illustration below.

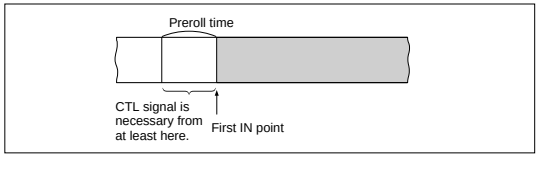


The CTL signal can be recorded by connecting a video camera or standard video signal generator to record its output signal continuously.



Assemble edit using a new tape

When assemble edit is performed from the beginning of a new tape or after a blank on the tape, CTL signal must be recorded as follows:



What is the assemble edit?

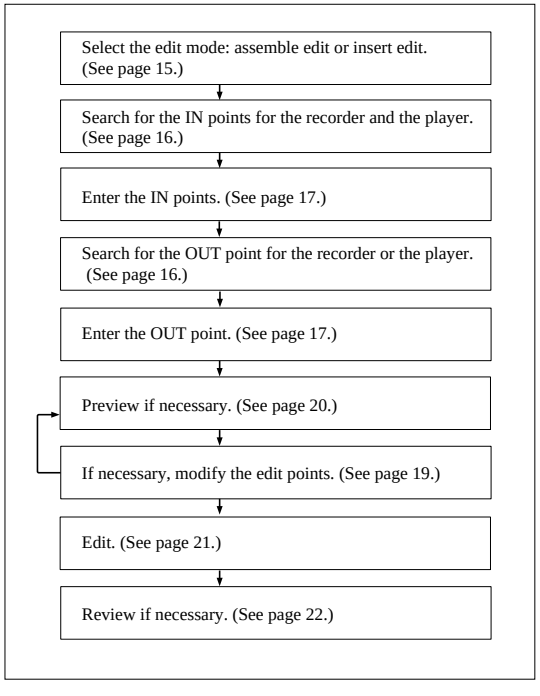
Video, audio and CTL signals are edited simultaneously in the assemble edit mode. If new material is edited on a previously recorded tape in this mode, the fully erased portion remains at the OUT point, and the continuity of the picture cannot be kept at that point. The assemble edit is useful to edit new signals scene by scene in sequence.

What is the insert edit?

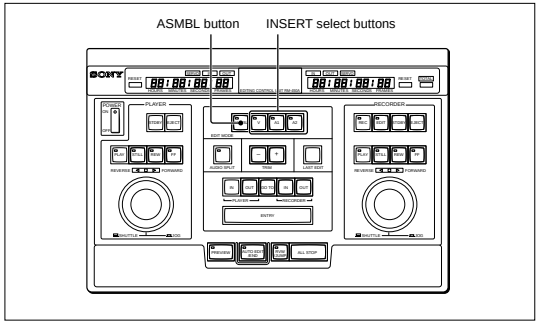
Video and/or audio signals are edited according to the CTL signals which are already recorded on the tape. Even if the new material is edited on a previously recorded tape in this mode, the continuity of the picture can be kept. The insert edit is useful to replace the video or audio signal of the recorded tape or to add video signal to the tape which has only audio signals recorded and vice versa.

Automatic Editing

Operation Flow


Select the edit mode: assemble edit or insert edit. (See page 15.)
Search for the IN points for the recorder and the player. (See page 16.)
Enter the IN points. (See page 17.)
Search for the OUT point for the recorder or the player. (See page 16.)
Enter the OUT point. (See page 17.)
Preview if necessary. (See page 20.)
If necessary, modify the edit points. (See page 19.)
Edit. (See page 21.)
Review if necessary. (See page 22.)

Selecting the Edit Mode



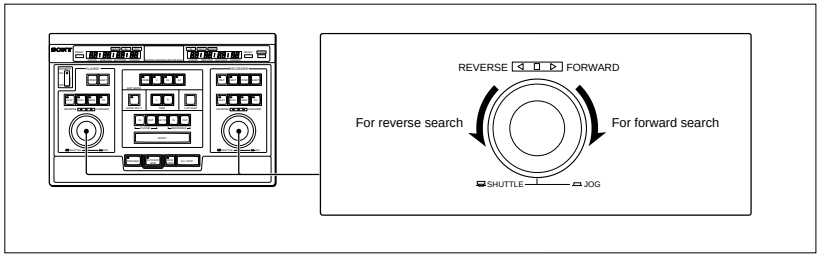
Selecting the assemble edit
Press the ASMBL button.
The ASMBL button lamp lights.

Selecting the insert edit
First select the signal: V (video), A1 (audio channel 1) and A2 (audio channel 2) with the INSERT select buttons. The corresponding button lamps light.

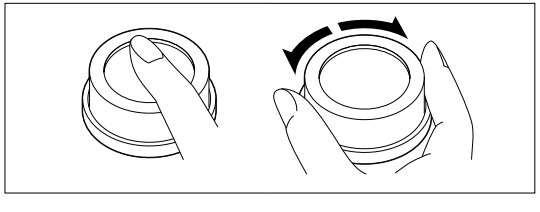
When the other edit button is lit
You cannot select the desired edit mode by pressing the corresponding button if the other edit mode button lamp is lit. Press the other edit mode button to cancel its mode, and then select the desired mode.

Determining the Edit Points — IN/OUT Points

Using the search dial



The search dial is convenient to use to search for the desired tape point. The search dial can playback the tape in the reverse and forward directions at various speeds. Therefore, you can find the scene for the desired edit point easily. The search dial operates in the shuttle or jog mode, and you can change the mode by simply pushing in the dial. The shuttle mode has three click positions, and the jog mode has no click position.



Shuttle mode

This mode is useful to search for an approximate edit point. The playback tape speed depends on the position of the dial. The tape runs within $^{1}/_{30}$ to 10 times the normal speed.

Jog mode

This mode is useful to precisely find the frame of a desired edit point. The playback speed depends on the speed at which you rotate the dial. The tape runs within $^{1}/_{30}$ to 3 times the normal speed.

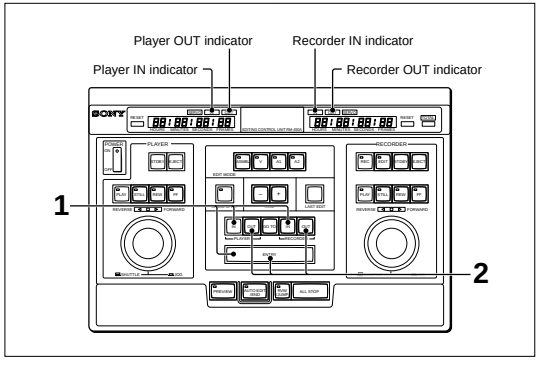
Using the PLAY/REW/FF buttons

You can search for the desired tape point by pressing the PLAY/REW/FF buttons.
Press the STILL button to stop the tape when you find the desired scene on the monitor.

Entering the Edit Points

Note

The first IN point should be set on the tape following the preset preroll time. The preroll time is set by using the PREROLL selector on the inside panel.



1 **Entering IN points for the player and the recorder**

Press the PLAYER IN or RECORDER IN button simultaneously with the ENTRY button at the desired point.
The PLAYER IN button is used for the player, and the RECORDER IN button is for the recorder.
The corresponding IN indicator lights, and the OUT indicator blinks to inform you that the OUT point should be entered.

2 **Entering OUT point for the player or the recorder**

Press the PLAYER OUT or RECORDER OUT button simultaneously with the ENTRY button at the desired point.
The corresponding OUT indicator lights.

When the IN and OUT indicators blink alternately

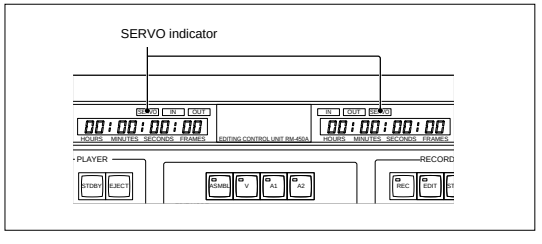
The unit is informing you that both the IN and OUT points are entered at the same tape point or that the OUT point is entered before the IN point. Enter the correct edit points.

When you selected the CTL signal as the time data

Errors may occur when playing back a tape which is missing some CTL signals or when repeatedly rewinding or fast-forwarding.

The last OUT point is automatically set.
When either of the OUT points is entered, the duration between the IN and OUT points of one VTR is automatically calculated and the other OUT point is set.

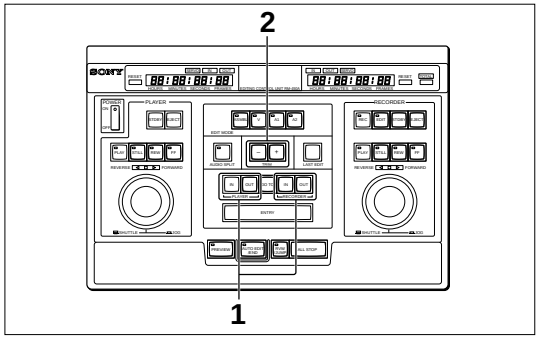
When the SERVO indicator lights
The servo-mechanisms cannot be locked between the IN and OUT points during automatic editing or preview.



Modifying the Edit Points Already Entered

Search for the desired edit point and press the PLAYER/RECORDER IN or OUT button simultaneously with ENTRY button again.

Changing the edit points frame by frame
You can change the edit points with the TRIM buttons to set them precisely.



1 Press and hold the IN or OUT button.
The frame number of the IN or OUT point is displayed on the time counter.

2 Press and release the TRIM + button to increase the edit point by one frame, or press and release the TRIM – button to decrease.
The number on the time counter changes.

Resetting the edit points
Press the RESET button to reset both of the edit points.
Press the RESET button simultaneously with the IN button to reset only the IN point, and simultaneously with the OUT button to reset only the OUT point.

Recalling the previous edit points
Press the LAST EDIT button.

Locating the edit points

Press the GO TO button simultaneously with the IN/OUT button.

Checking the IN/OUT point

You can check the time data of the edit points on the time counter while pressing the IN or OUT button.
You can check the duration between the IN and OUT points by pressing the IN and OUT buttons simultaneously.

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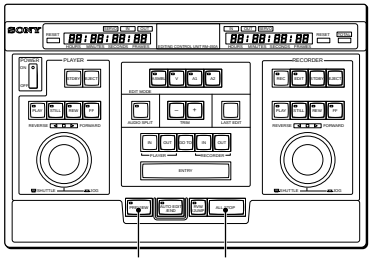
Automatic Editing

Preview

Use this function to perform the editing rehearsal. If this is not necessary, skip to “Executing the Edit”.



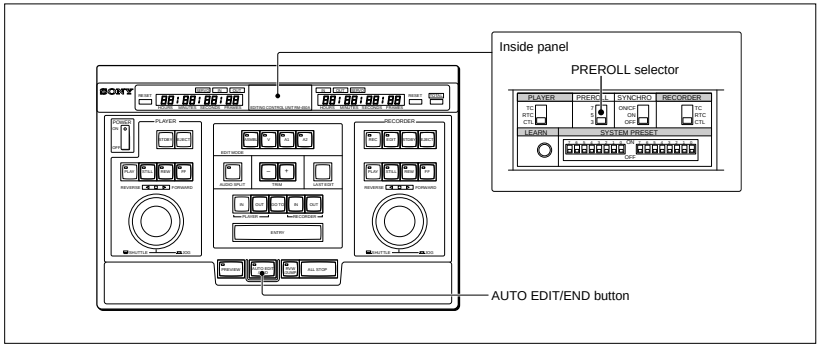
Press the PREVIEW button.

The PREVIEW lamp lights and the tape portion between the IN and OUT points is played back. The picture in the E-E mode can be monitored on the monitor connected to the recorder. Both the player and the recorder stop at the point two seconds after the respective OUT points. If you want to make changes, change the edit point and perform the preview operation again. Refer to “Modifying the edit points already entered”.

Cancelling the preview operation
Press the ALL STOP button.

What is the E-E mode?
E-E is an abbreviation of the Electric to Electric and means that the unit outputs the signal whose waveform is the same as that of the input signal.

Executing the Edit



Press the AUTO EDIT/END button after the edit points are entered.

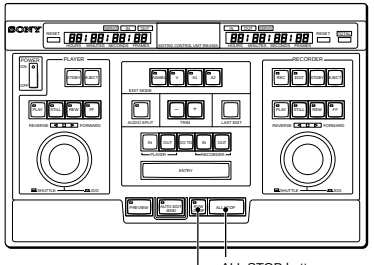
The AUTO EDIT/END button lamp lights and editing is started.
You can observe the edit on the monitor connected to the recorder. The tape runs from the time (as set by using the PREROLL selector) prior to the IN point to 2 seconds after the OUT point.

VTR operation at the OUT point
When the editing has finished, a still picture of the OUT point is displayed.
Assemble edit mode: Editing is continued for 2 seconds after the OUT point, and then the recorder returns to the OUT point.
Insert edit mode: Editing is finished at the OUT point, and both the recorder and player run to the tape point 2 seconds after the respective OUT points. Then, the recorder returns to the OUT point and the still image of the OUT point is output.

Stopping the edit
Press the AUTO EDIT/END button to stop editing.
The point where you pressed the button is regarded as the OUT point of this editing, and editing is completed in the same manner as that already described.

Automatic Editing

Review



After completing the edit, you can review the edited picture.
Press the RVW/JUMP button.

The RVW/JUMP button lamp lights, and then the picture is reproduced by the recorder. You can check the edited picture on the monitor connected to the recorder.
When the review operation is completed, the recorder runs to the OUT point.

Checking the OUT point during review operation
You can make the tape run to the OUT point quickly during the review operation.
Press the RVW/JUMP button at any point after the IN point.
Then the tape runs to the point 5 seconds before the OUT point at high speed, and the VTR starts playback from that point to the point 2 seconds after the OUT point. After playback, the tape returns to the OUT point.

Note

This function cannot operate when the duration between the IN and the OUT points is less than 10 seconds.

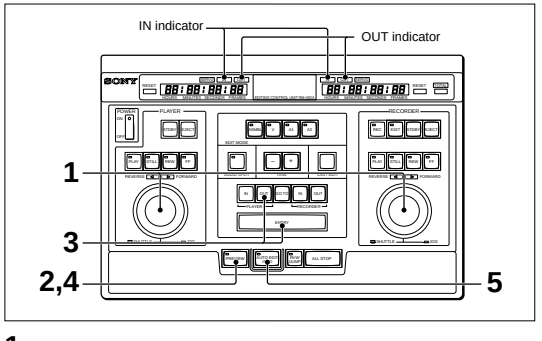
Cancelling the review operation
Press the ALL STOP button.

Useful Editing

In this section, useful edit operations are described.
- **Quick editing:** You can enter the OUT point during the preview operation.
- **Butt edit:** You can continuously edit by searching for the IN point only on the player.
- **Split editing:** You can independently insert audio or video signals at each IN point.
- **Using a VTR with the dynamic tracking function:** You can control the VTR with the dynamic tracking function as a player from this unit.
- **Editing with a live source:** You can edit material supplied from a camera.

Quick Editing

You can save time by entering edit points while the unit is in the preview mode.



1 Searching for the IN points
Locate the scene for the IN points on both the recorder and the player with the search dial, and display the still picture of each point.

2 Preview
Press the PREVIEW button.
The position when you pressed the button is automatically entered as the IN point. The respective IN indicators light and the preview starts.

3 Determining the OUT point
Determine the OUT point while observing the monitor, then press the OUT and the ENTRY buttons simultaneously.
This point is entered as the OUT point and the OUT indicator which was blinking is now lit.
After 2 seconds, both the player and the recorder stop.

(Continued)

4 **Preview**
If necessary, press the PREVIEW button to perform the preview operation to make sure of editing.

5 **Editing**
Press the AUTO EDIT/END button to perform editing.

Changing the OUT point

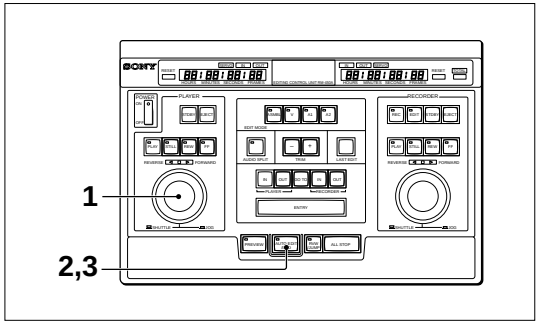
After proceeding to Step **3**, use the search dial to find the precise scene for the OUT point either on the player or on the recorder. When you find the scene, press the ENTRY and OUT buttons simultaneously.
Then press the AUTO EDIT/END button.

Editing even more quickly

Instead of pressing the PREVIEW button in Step **2**, press the AUTO EDIT/END button and go on to Step **3**. Preview is omitted and actual editing starts immediately.

Butt Edit

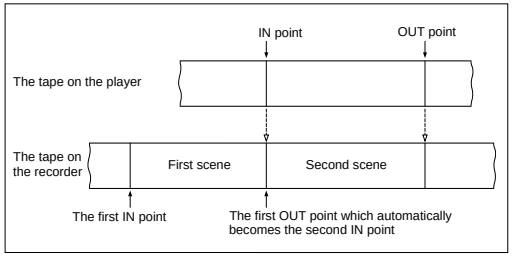
You can continuously perform the assemble edit by entering the edit points on the player only. When one editing from the IN point to the OUT point is completed, the tape of the recorder returns to the OUT point, and stops there.
This OUT point can be used as the next IN point for the recorder. Therefore to continue editing, all you have to do is to enter the edit points for the player by pressing the AUTO EDIT/END button.



1 **Searching for IN point for the player**

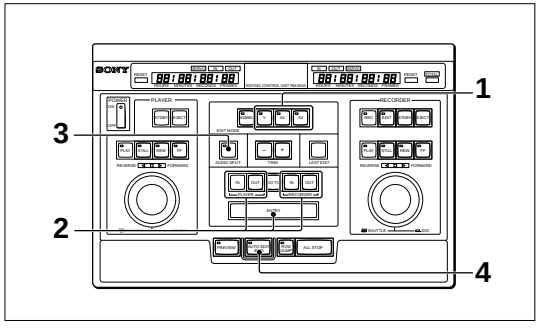
2 **Editing**
Press the AUTO EDIT/END button to set the IN point.
The editing begins.

3 **Stopping editing**
Press the AUTO EDIT/END button again to stop editing. This point is entered as the OUT point, and editing is completed.


IN point
OUT point
The tape on the player
The tape on the recorder
First scene
Second scene
The first IN point
The first OUT point which automatically becomes the second IN point

Split Editing

In the insert edit mode, you can start editing the video, audio channel-1 and channel-2 independently. This is called “split editing”.



1 **Selecting the insert channel**
Press the desired insert button(s) to select the signal(s) to insert: V, A1 and A2.

2 **Entering the edit points of the video channel**
Enter the video IN/OUT points when you are to insert the video channel of the player and the recorder.

3 **Entering the IN point of the audio channel**
Press the AUDIO SPLIT button and enter the audio IN point of the player or the recorder.
The AUDIO SPLIT button lamp blinks.

4 **Executing the automatic edit**
Press the AUTO EDIT/END button.
Editing begins and automatically finishes.

What does the AUDIO SPLIT lamp indicate?

You can enter only the audio edit points while the AUDIO SPLIT lamp is lit. If you press the AUDIO SPLIT button again while its lamp is lit, the lamp starts blinking and you can enter the video edit points.

You can enter the audio IN/OUT points first

Press the AUDIO SPLIT button and enter the audio IN/OUT points of the player and the recorder in Step **2**. Then press the AUDIO SPLIT button again and enter the video IN point of the player or the recorder in Step **3**.

Using a VTR with the Dynamic Tracking™ Function

This unit can control a VTR with the dynamic tracking™ function as a player.
The operation is slightly different from the other types of VTR.

1 **Shifting to the control mode to control a VTR with the dynamic tracking function**
Enter the IN and OUT points of the player at the same tape point.
You can control the VTR with the dynamic tracking function. The point you entered as the IN/OUT points is regarded as the IN point.

2 **Entering the edit points of the recorder**
Enter the IN and OUT points of the recorder.

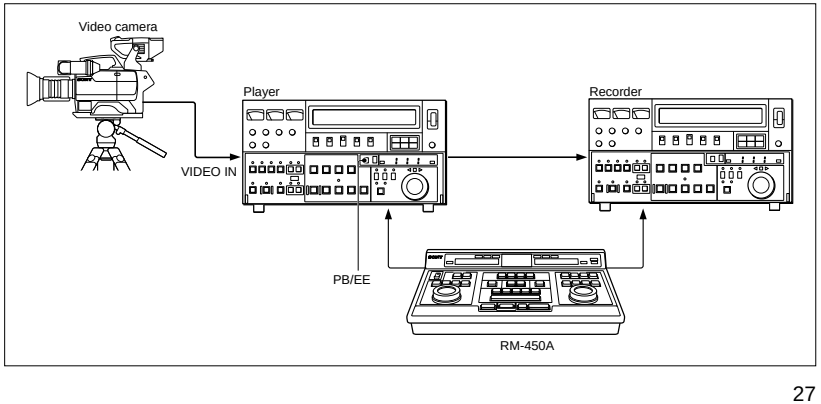
3 **Determining the playback speed of the player**
Select the playback speed of the player with the PLAYER search dial in the shuttle mode.
The speed can be selected between the –1 to 3 times the normal speed.
(–1 to 2 times in the case of the “BETACAM” VTR)

The rest of the operation is the same as that of other VTRs.

You can change the determined speed after the IN point.
You can change the speed determined in Step **3** during editing after the player passes the IN point.

Editing with a Live Source from a Video Camera

Preparations

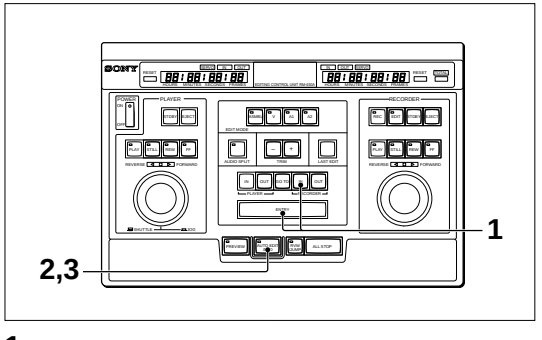


Useful Editing

Notes

- When the player is set in the playback mode, the playback signal of the tape is supplied to the recorder.
  Therefore, to edit a live source from a video camera, set the player in the STANDBY OFF mode by pressing the STDBY button.
- When the player has a time base corrector, supply the same reference sync signal to this unit and a camera or supply the video signal output from a camera to the recorder.

Performing assemble edit



1 Enter the IN point for the recorder.

2 Press the AUTO EDIT/END button.
Editing of signals from the camera begins.

3 Press the AUTO EDIT/END button when you find the scene for the OUT point.
Editing is completed.

Performing insert edit

1 Enter the IN and OUT point for the recorder.

2 Press the AUTO EDIT/END button.
Editing of signals from a camera begins and is automatically completed.

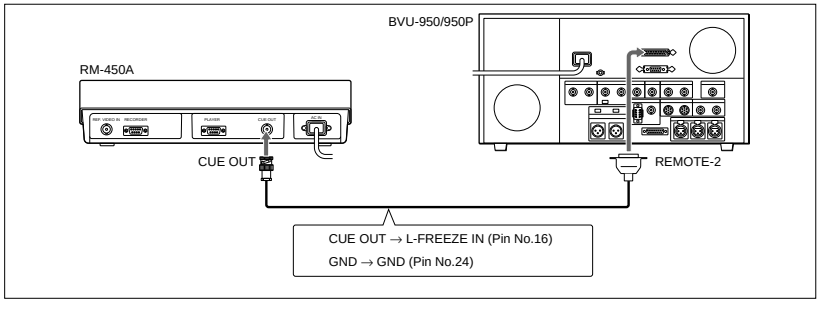
Entering the edit points in the insert mode
You do not need to enter the OUT point in the insert mode either. Press the AUTO EDIT/END button when the scene for the OUT point is found.

Editing a Freeze Picture

When the BKU-903A digital time base corrector (optional) and BKU-904 digital noise reducer (optional) are installed in the connected BVU-900/900P or BVU-950/950P, you can edit a freeze picture by using the signal output from the CUE OUT connector.

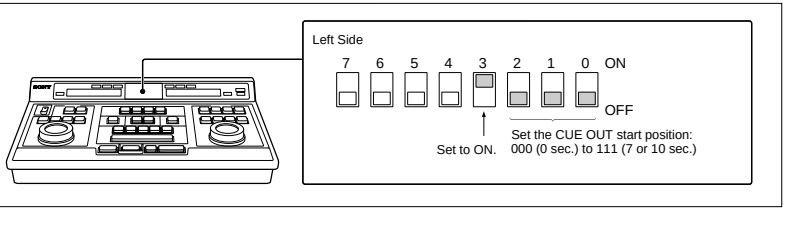
Connections

Connect the CUE OUT connector of this unit and the REMOTE-2 (24 pin) of the BVU-900/900P or BVU-950/950P.
Refer to the maintenance manual of the BVU-900/900P or BVU-950/950P.



Preparation

Set the SYSTEM PRESET switch on the left side as follows:

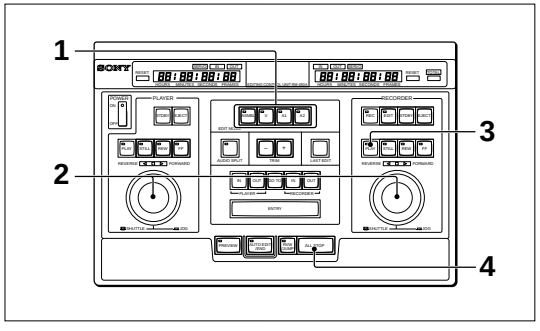


Operation

1 Set the FREEZE button of the BVR-55/55P remote control unit supplied with the BKU-903A to ON.

2 Perform a preview or automatic edit.
The BVU-900/900P or BVU-950/950P outputs a freeze picture from the time set by the SYSTEM PRESET switch to the OUT point.

Manual Editing



1 Selecting the edit mode

Press the ASMBL button or the desired insert button(s): V, A1 and A2. The lamp(s) of the pressed button(s) light.

2 Searching for the IN point

Search for the IN point and go back to several seconds before that point. Then play back both the recorder and the player.

3 Starting the edit

Press the EDIT button and PLAY button for the recorder simultaneously at the IN point.
Editing begins.

4 Completing edit

Press the ALL STOP button when you find the OUT point.
Editing stops and both the recorder and the player shift to the stop mode. If you press the PLAY or STILL button of the recorder instead, editing also stops but the VTRs shift to the mode of the button you pressed.

Notes

- To have an edited picture as stable as possible, start playback at least 5 seconds ahead of the IN point.
- Do not start editing from the still mode. Otherwise, the edited picture will be distored.
- A still picture cannot be recorded with a VTR having no dynamic tracking function.

Error Messages

This unit displays an error number on the time counter to indicate that an error has occurred.

Error No.	Meaning
1	The recorder cannot be controlled when the unit is to perform the automatic operation including the pinch on delay detection (LEARN) function.
2	The recorder is in the STANDBY OFF mode when the unit is to perform the automatic operation including the LEARN function.
3	The tape inserted in the recorder is in the record inhibit mode.
4	The edit mode is not selected yet when the unit is to perform the automatic edit.
5	The OUT point is ahead of the IN point.
6	The video IN point is not entered when the unit is to perform the automatic split edit.
7	The unit cannot find the IN or OUT point by the GO TO key operation, or the tape is too short to preroll.
8	The servo-mechanisms cannot be locked at the IN point. However, this message is not displayed when bit 5 of the right DIP switches on the inside panel is set to ON.
9	The unit failed to synchronize the player and the recorder when bit 4 of the right DIP switches is set to ON.
10	The unit cannot detect what type of VTR is connected when the unit is to perform the automatic edit. Please set the edit timing manually.
11	The operation for the automatic split editing is made although you selected the assemble edit mode.
12	The connected VTR is operated manually while the unit is performing the automatic edit.
13	The player's operation cannot be detected when the LEARN button is pressed.
14	The player is in the STANDBY OFF mode when the LEARN button is pressed.

Specifications

Depending on the videocassette recorder connected to this unit, the function of this unit may be limited.

Automatic controls	PREVIEW, AUTO EDIT/END (Insert/ASMBL), RVW/JUMP, LEARN
Manual controls	Recorder: REC, EDIT Player/Recorder: FF, STILL, REW, PLAY, Search dial ($^1/_{30}$ to 10 times the normal playback both in the forward and reverse directions)
Frame modification	IN and OUT points, possible on the player and/or recorder separately in the manual mode.
Digital time counter	Time code: 00:00:00:00 to 23:59:59:24 CTL/RTC: ±9:59:59:24 or 00:00:00:00 to 23:59:59:24 (selectable) (indicated on both the player and the recorder time counter)
Editing accuracy	Time code mode: ±0 frame during synchronization CTL mode: ±1 frame during synchronization
Connectors	AC IN: 3-pin inlet PLAYER/RECORDER: 9-pin connectors CUE OUT: BNC connector, Active low, Low level 0 to 0.5 V High level 3.5 to 5 V REF. VIDEO IN: BNC connector, 75 ohms Video signal 0.5 to 2 Vp-p Composite sync input 0.5 to 5 Vp-p
Power requirements	USA model: 120V AC, 50/60 Hz European model: 230 V AC, 50/60 Hz
Power consumption	USA model: 0.1 A European model: 11 W
Operating temperature	0°C to 40°C (32°F to 104°F)
Storage temperature	–20°C to 60°C (–40°F to 140°F)
Dimensions	approx. 390 × 93 × 265 mm (w/h/d) ($15\,^2/_8 \times 3\,^3/_4 \times 10\,^1/_2$ inches)
Weight	3.1 kg (6 lb 13 oz)

Accessories supplied

AC power cord (1)
Error message card (1)
Operation manual (1)

Optional accessories

9-pin to 9-pin remote control cable
RCC-5G (5 m, 15 feet)
RCC-10G (10 m, 30 feet)
RCC-30G (30 m, 90 feet)
RMM-450 rack mount metal
SU-450 double size table

Design and specifications subject to change without notice.

Troubleshooting

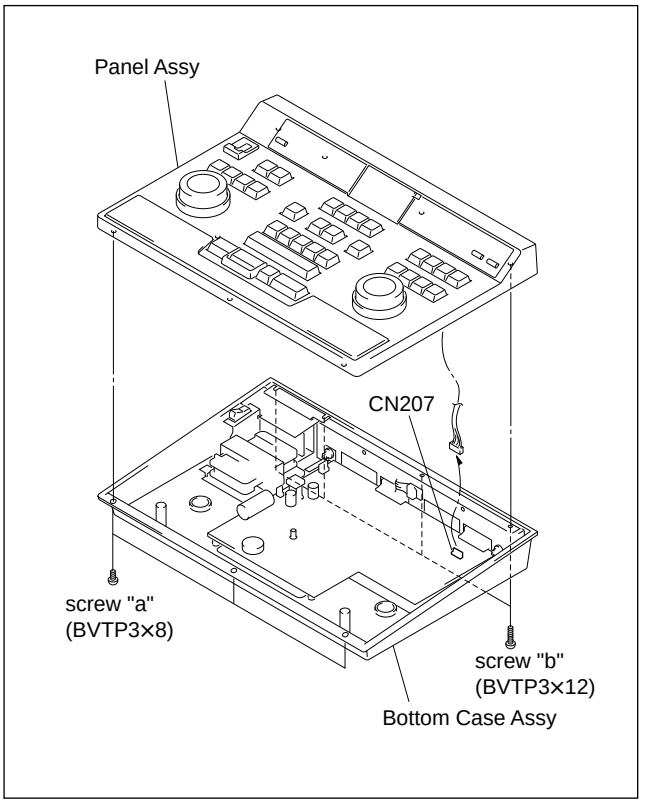
Many apparent malfunctions may be caused by a mis-operation that has been overlooked, or some other equally simple cause.
Should any difficulty arise in operation, check through this list of symptoms and possible causes. Should the difficulty persist, contact the dealer from whom this unit was purchased, or a local Sony dealer.

Symptom	Check points
No figures on the time counter	• The REMOTE/LOCAL switch of a VTR is set to LOCAL. (See page 12.) • The VTR is not turned on. (See page 12.) • Are the connections made firmly? (Insert the connectors firmly in position.) The counter number for the disconnected player or recorder will not be indicated. (See page 11.)
No figure's change on the time counter	Unless the CTL signal is recorded on the tape, the figure will not change on the counter. (See page 13.)
No preview, no AUTO EDIT mode even though these buttons are pressed	• Is the inserted cassette set in the REC INHIBIT mode? • Are the connections made firmly? (Insert the connectors firmly in position.) (See page 11.) • Does the tape reach to the end? (Rewind the tape). • Is the INPUT SELECT switch of the videocassette recorder set correctly? • When insert editing, press the INSERT select button correctly. (See page 15.) • When insert editing, record the CTL signal on the tape before editing. • When assemble editing, record the CTL signal before the first IN point. • Are the IN lamp and OUT lamp blinking alternately? (Re-enter the editing points correctly.)
PREVIEW and AUTO EDIT modes function but the editing points are not correct. (They are different from the entered points.)	• After entry of the edit points, was the time counter not reset to "0"? (See pages 6, and 17) • The memorized points and the actual editing points may be different slightly according to the recorder used. (Make fine adjustment with the TRIM button before editing.) (See page 19.)
Picture becomes unstable at the position where the editing is performed.	• If the CTL signal breaks at that position, the picture will be unstable. (See page 13.) • If the recording is started with the REC button, the picture will be unstable. (Start recording with the AUTO EDIT/END or EDIT button.)
Lateral stripes appear on the picture.	The guard band noise (lateral stripes) which appears on the playback picture except at normal speed is not malfunction.
Playback picture is unstable.	• Does not the external signal applied to the VTR contain noise? (Re-select the position of the INPUT SELECT switch.) • When insert editing, if the recorded CTL signal is not normal or contains noise, the playback picture will be unstable. (See page 13.) • If the player is in the picture search mode, the playback picture of the recorder may be unstable. (Set the player in the normal playback or STILL mode.)
The picture in the picture search operation is unstable.	Adjust the vertical and horizontal hold controls on the video monitor.

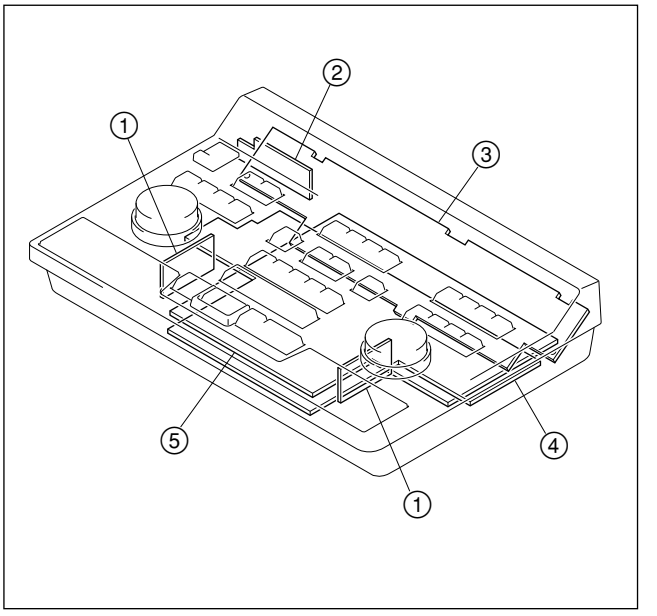
SECTION 2
SERVICE OVERVIEW

2-1. REMOVAL OF CABINET

1. Remove three screws “a” (BVTP3×8) and four screws “b” (BVTP3×12).
2. Disconnect one connector (CN207) on CPU-3A board, and remove panel assy from bottom case assy.



2-2. BOARD LAYOUT



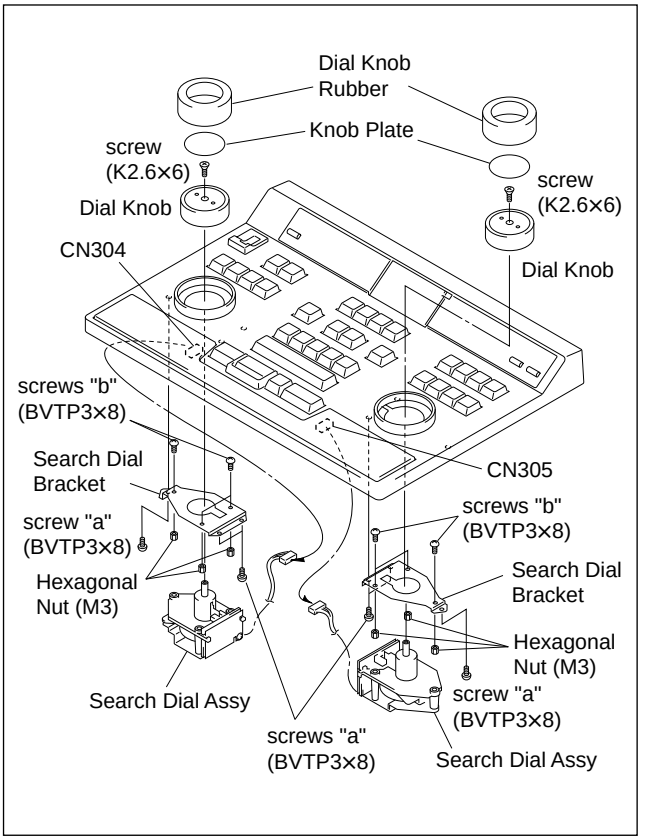
① PTC-32 Board
② AC-1 Board
③ DSP-1A Board
④ KSW-1 Board
⑤ CPU-3A Board

2-3. REMOVAL OF MAIN PARTS

Preparation : Remove the panel assy.
(Refer to section 2-1.)

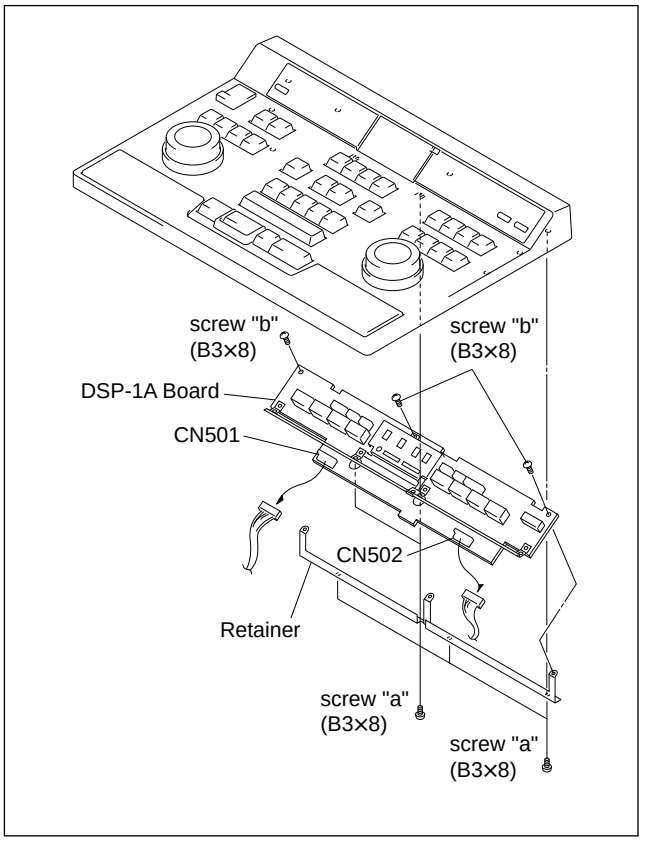
2-3-1. Search Dial Assy

1. Disconnect two connectors (CN304, 305) on KSW-1 board.
2. Pull dial knob rubber out to upper direction and remove one screw (K2.6×6), then remove dial knob.
3. Remove three screws “a” (BVTP3×8) and remove search dial assy with search dial bracket.
4. Remove three screws “b” (BVTP3×8) and remove the search dial assy from the search dial bracket.



2-3-2. DSP-1A Board

1. Disconnect two connectors (CN501, 502) on DSP-1A board.
2. Remove five screws “a” (B3×8).
3. Remove three screws “b” (B3×8) and remove the DSP-1A board from retainer.



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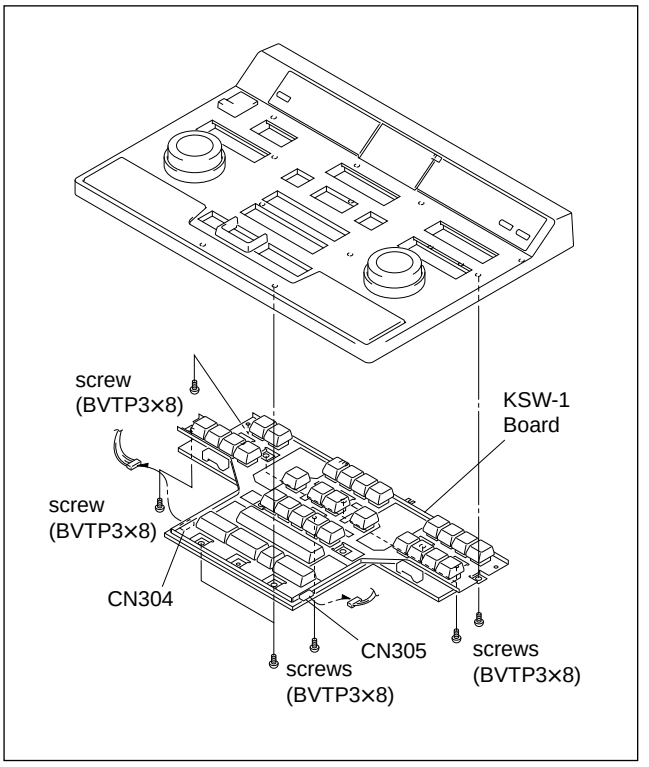
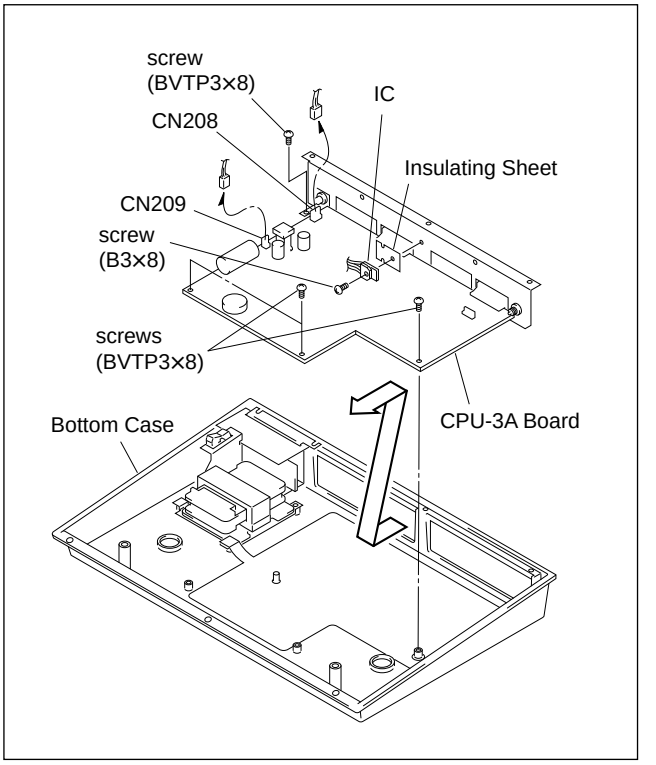
2-3-3. KSW-1 Board

1. Disconnect two connectors (CN304, 305) on KSW-1 board.
2. Remove eleven screws (BVTP3×8) and remove the KSW-1 board.



2-3-4. CPU-3A Board

1. Disconnect two connectors (CN208, 209) on CPU-3A board.
2. Remove one screw (B3×8) and remove IC and insulating sheet.
3. Remove four screws (BTP3×8) and remove the CPU-3A board from bottom case in the arrow direction.



2-4. IN/OUT SIGNAL FOR CONNECTOR

2-4-1. CPU-3A Board

PLAYER connector (RS-422A)

D-sub 9-pin port

Pin	Signal
1	GND
2	P-RECEIVE A IN
3	P-TRANSMIT B OUT
4	GND
5	—
6	GND
7	P-RECEIVE B IN
8	P-TRANSMIT A OUT
9	GND

RECORDER connector (RS-422A)

D-sub 9-pin port

Pin	Signal
1	GND
2	R-RECEIVE A IN
3	R-TRANSMIT B OUT
4	GND
5	—
6	GND
7	R-RECEIVE B IN
8	R-TRANSMIT A OUT
9	GND

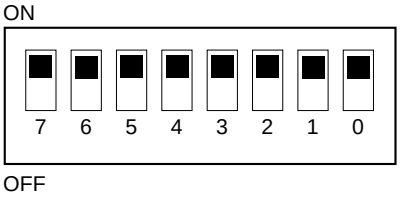
REF. VIDEO IN connector (BNC type)
75 Ω, Unbalance
Video signal ; 0.5 to 2 Vp-p
Composite sync signal ; 0.5 to 5 Vp-p

CUE OUT connector (BNC) type
Active LOW
LOW level ; 0 to 0.5 V
HIGH level ; 3.5 to 5 V

2-5. SWITCH SETTING (FACTORY SETTING)

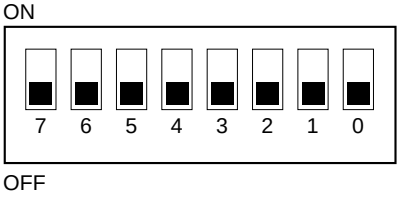
2-5-1. CPU-3A Board

S201

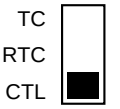


2-5-2. DSP-1A Board

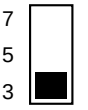
SYSTEM PRESET switch



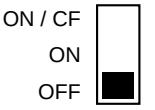
PLAYER TC / RTC / CTL selector



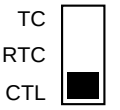
PREROLL selector



SYNCHRO selector



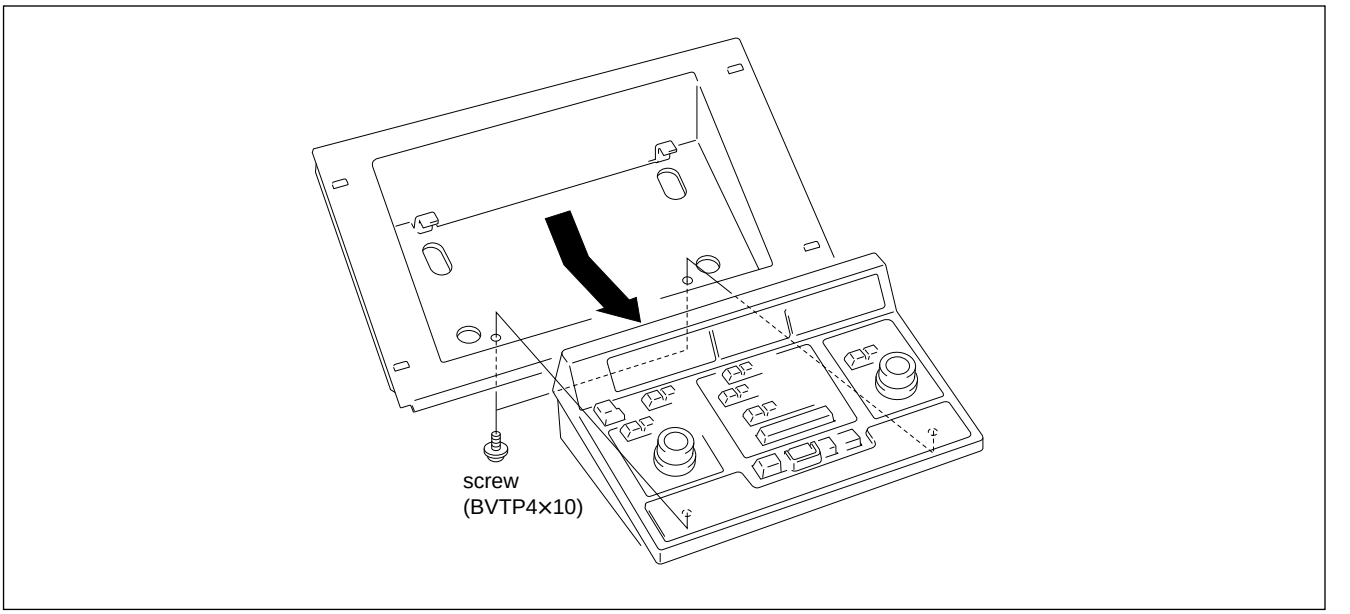
RECORDER TC / RTC / CTL selector



2-6. RACK MOUNTING

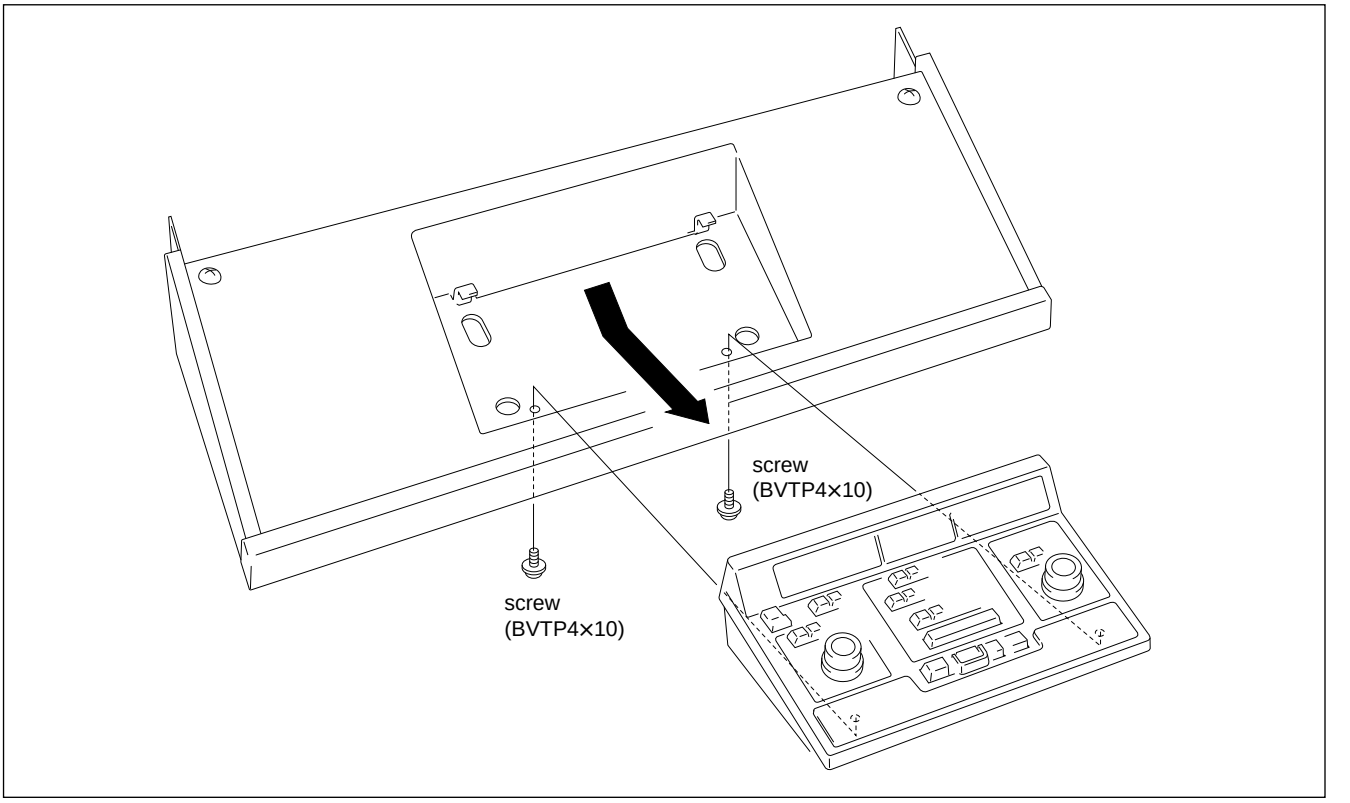
2-6-1. Removal of the RM-450A from RMM-450

Remove two screws (BVTP4×10) and pull the RM-450A out from the rack mount.



2-6-2. Removal of the RM-450A from SU-450

Remove two screws (BVTP4×10) and pull the RM-450A out from the rack mount.



2-7. REPLACEMENT OF PARTS

2-7-1. Notes on Spare Parts

(1) Safety Related Components Warning

Components marked ⚠ are critical to safe operation. Therefore, specified parts should be used in the case of replacement.

(2) Standardization of Parts

Spare parts supplied from Sony Parts Center may not be always identical with the parts which actually in use due to “accommodating the improved parts and/or engineering changes” or “standardization of genuine parts”.

This manual's exploded views and electrical spare parts list are indicating the part numbers of “the standardized genuine parts at present”.

(3) Stock of Parts

Parts marked with “o” SP (Supply Code) column of the spare parts list are not normally required for routine service work. Orders for parts marked with “o” will be processed, but allow for additional delivery time.

(4) Units for Capacitors, Inductors and Resistors

The following units are assumed in schematic diagrams, electrical parts list and exploded views unless otherwise specified.

Capacitors : μF
Inductors : μH
Resistors : Ω

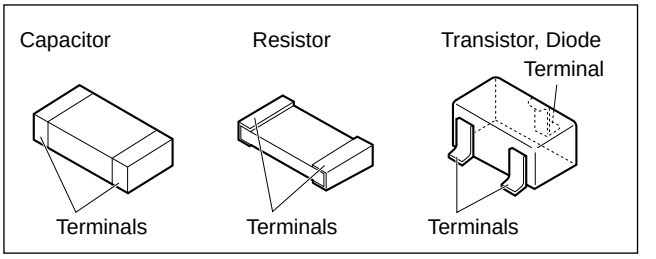
2-7-2. Replacement of Chip Parts

Required Tools

Soldering iron : 20 W
If possible, use a soldering-iron tip heatcontroller set to 270 ± 10 °C.
Braided wire : Solder Taul or equivalent
Sony part No. 7-641-300-81
Solder : 0.6 mm dia. is recommended.
Tweezers

Soldering Conditions

Soldering iron temperature : 270 ± 10 °C
Soldering time : Less than 2 seconds per pin



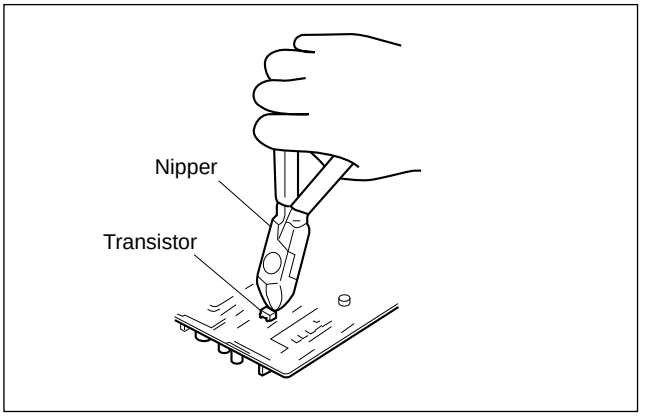
Replacement of Resistor and Capacitor

1. Place the soldering-iron tip onto the chip part and heat it up until the solder is melted. When the solder is melted, slide the chip part aside.
2. Make sure that there is no pattern peeling, damage and/or bridge around the desoldering position.
3. After removing the chip part, presolder the area, in which the new chip part is to be placed, with a thin layer of solder.
4. Place new chip part in the desired position and solder both ends.

NOTE Do not use a chip part again once it has been removed.

Replacement of Transistors and Diodes

1. Cut the terminals of the chip part with nippers.
2. Remove the cut leads with soldering iron as above.
3. Make sure that there is no pattern peeling, damage and/or bridge around the desoldering positions.
4. After removing the chip part, presolder the area, in which the new chip part is to be placed, with a thin layer of solder.
5. Place new chip part in the desired position and solder the terminals.



Replacement of ICs

1. Using the braided wire, “SOLDER TAUL” (Sony Part No. 7-641-300-81), remove the solder around the pins of the IC-chip to be removed.
2. While heating up the pins, remove the pins one by one using sharp-pointed tweezers.
3. Make sure that there is no pattern peeling, damage and/or bridge around the desoldering position.
4. After removing the chip part, presolder the area, in which the new chip part is to be placed, with a thin layer of solder.
5. Place new chip part in the desired position and solder the pins.

2-8. SAFETY CHECK-OUT

After correcting the original service problem, perform the following safety checks before releasing the set to the customer :

Check the metal trim, “metallized” knobs, screws, and all other exposed metal parts for AC leakage. Check leakage as described below.

LEAKAGE TEST

The AC leakage from any exposed metal part to earth ground and from all exposed metal parts to any exposed metal part having a return to chassis, must not exceed 0.5 mA. Leakage current can be measured by any one of three methods.

1. A commercial leakage tester, such as the Simpson 229 or RCA WT-540A. Follow the manufacturers’ instructions to use these instruments.
2. A battery-operated AC milliammeter. The Data Precision 245 digital multimeter is suitable for this job.
3. Measuring the voltage drop across a resistor by means of a VOM or battery-operated AC voltmeter. The “limit” indication is 0.75 V, so analog meters must have an accurate low-voltage scale. The Simpson 250 and Sanwa SH-63Trd are examples of a passive VOM that is suitable. Nearly all battery operated digital multimeters that have a 2 V AC range are suitable. (See Fig. A)

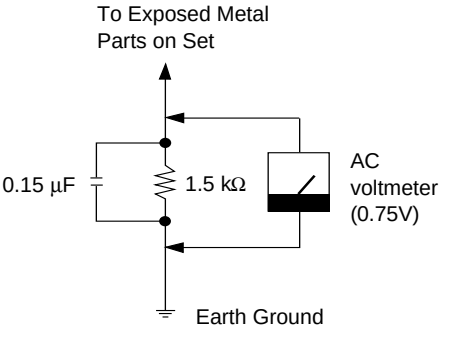


Fig A. Using an AC voltmeter to check AC leakage.

SECTION 3
TROUBLESHOOTING

3-1. GENERAL

No electrical adjustment is required in this machine.
Use of a simple checker and a built-in test program can check all operations.
A test program activating method and checking items are described below.

3-1-1. Keyboard Check

Turn ON the POWER switch while pressing the LEARN and ASMBL keys at the same time.
Checking items :

- LED ON/OFF
- Non-locking switch operation
- Locking switch operation
- JOG/SHUTTLE operation of Search Dial
- RS-232C line operation of KSW-1 board
- Backup data (LEARN data) verification
- ROM and RAM check by CPU on KSW-1 board

3-1-2. Backup Function Check in Keyboard

Turn ON the POWER switch while pressing the LEARN and A1 keys at the same time.
Checking items :
Backup function check by CPU on KSW-1 board
The “Error” is displayed when the POWER switch is turned ON at the first time (or when the backup capacitor C305 on the KSW-1 board is discharging).
Further error display is not made if the backup function is normal.
The capacitor can afford to provide backup for at least seven days.

3-1-3. CPU-3A Board Check

Turn ON the POWER switch while pressing the LEARN and A2 keys at the same time.
The CPU board is automatically checked.
(Start by EJECT key on the RECORDER side.)
If a fault is found, the operation is stopped immediately and the error code is displayed.
For this purpose, the service tools are required.

3-1-4. Software Operation Check and REF. VIDEO Circuit Check

Turn ON the POWER switch.
D219 (CHECK3 LED) on the CPU board blinks by the software. In addition, D217 (CHECK1 LED) blinks when a signal is entered into the REF. VIDEO IN terminal.

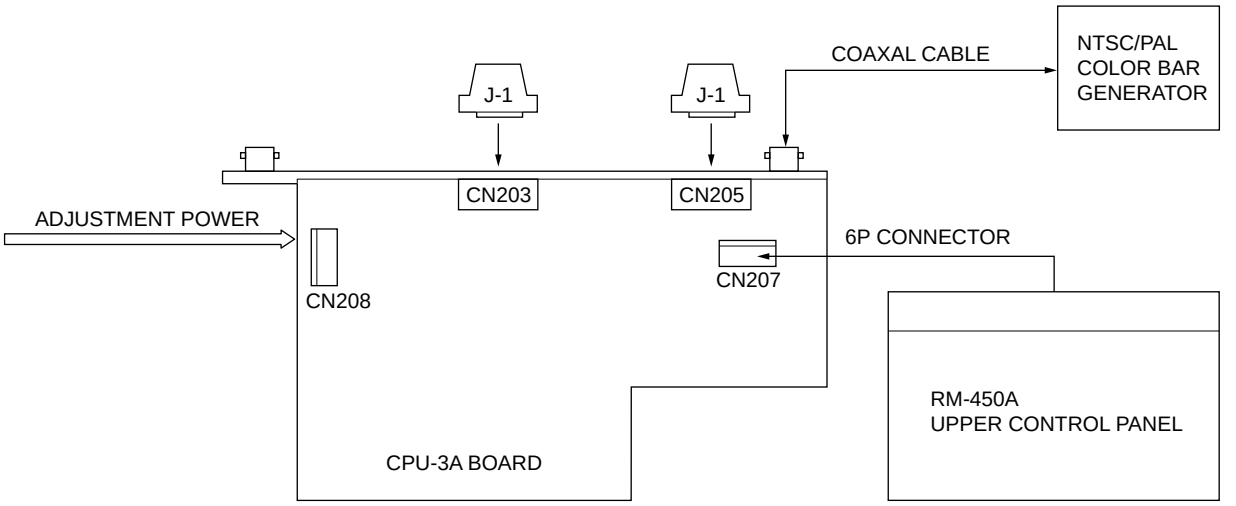
3-1-5. Address Bus Check (Power ON after S201 OFF)

Turn OFF the 8-bit DIP switch S201 on the CPU board through it is usually set to ON position. The CPU then executes NOP (00) since the data bus on the CPU board is isolated from devices other than CPU and pulled down by a resistor. At this time, the address line shows simple increments. (However, a refreshed address is assigned to A7 to A15.)
Observation of a waveform on the address line with an oscilloscope makes fault identification easier.

3-2. SERVICE TOOLS (NECESSARY FOR CPU-3A BOARD CHECK)

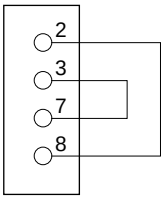
Ref. No.	Description	Part No.	Q’ty	Use
J-1	9P short connector	J-6210-220-A	2	CPU-3A board operation check
J-5	VIDEO signal or sync. signal generator		1	CPU-3A board operation check

Connection



Connector Circuit Diagram for Service Tools

J-6210-220-A
(J-1)



3-3. OPERATION CHECK PROCEDURE (DETAILED DESCRIPTION FOR 3-1-1, 3-1-2 AND 3-1-3)

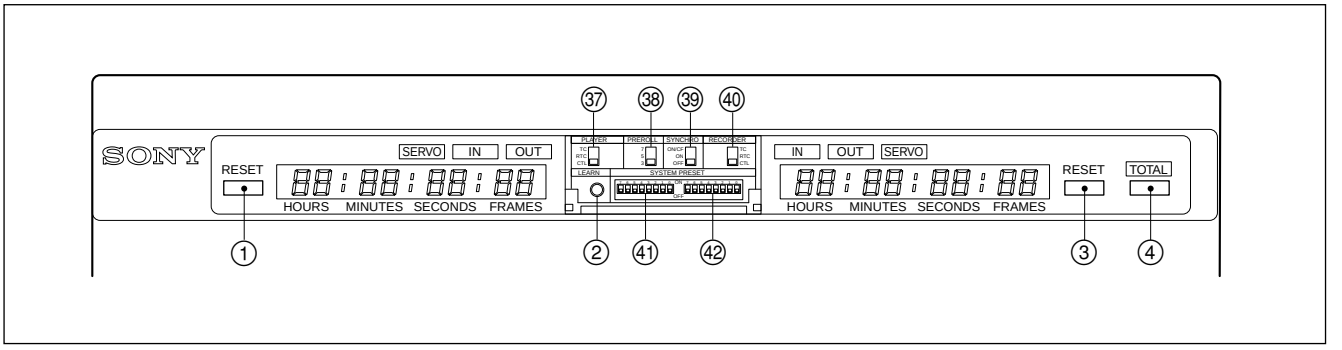


Fig. 1

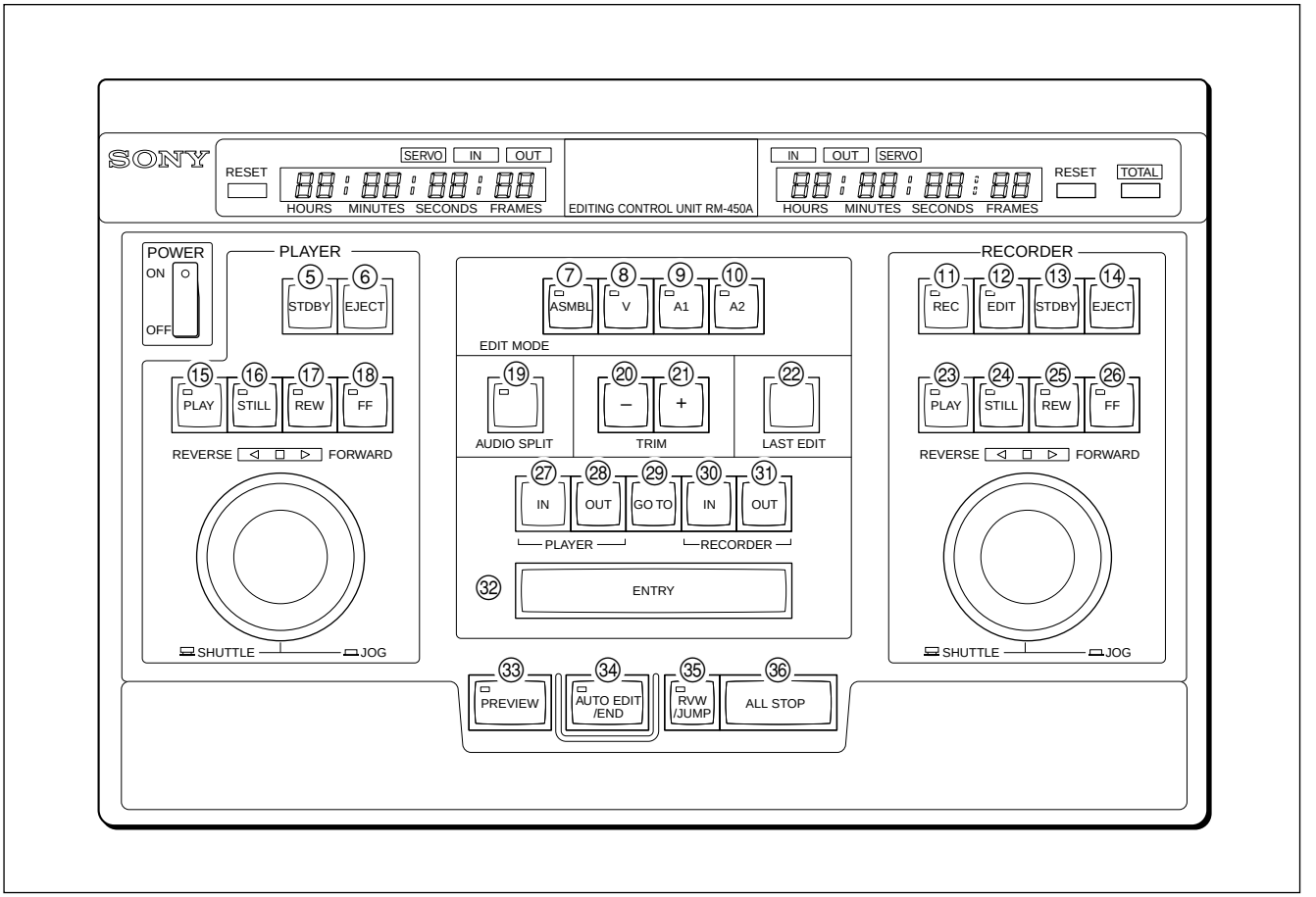


Fig. 2

3-3-1. Keyboard Check

1) Turn power ON while pressing the ② LEARN key in Fig. 1 and the ⑦ ASMBL key in Fig. 2 at the same time.

All LEDs must come on.

2) Press the ⑭ EJECT key.

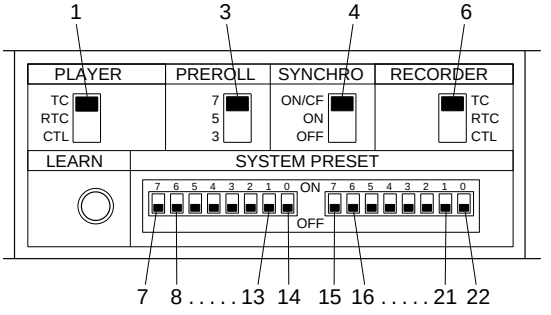
All LEDs must go off.

3) Again press the ⑭ EJECT key, and "11…" appears on the left 7-segment display.
Press keys in the order of ①, ②, ③…㉟ and ㊱.
When mistake the operation, press keys in the order of ①, ②, ③…㉟ and ㊱ again.

01, 02…35, 0H must appear on the right 7-segment display.
No error display allowed.

4) Press the ⑭ EJECT key.
"22…" appears on the left 7-segment display while "P1 on" appears on the right 7-segment display.
(1) Place all indoor switches ㊲ to ㊷ in Fig. 1 in upper position, and press the ⑭ EJECT key.
If a fault is found, "Error" is displayed. In this case, press the ⑬ STDBY key, then the number of error switch is displayed.
If many error exist, the number of next error switch is displayed whenever press the ⑬ STDBY key.
For switch number, refer to the following.

"P1_ _ _ _0H" must appear on the right 7-segment display.
No error display allowed.



(2) Place the above switches in lower position, and press the ⑭ EJECT key twice.
(3) Place ㊲, ㊳, ㊴ and ㊵ switches in Fig. 1 in center position, and press the ⑭ EJECT key twice.

"P2_Error" must appear on the right 7-segment display.
Press the ⑬ STDBY key. → "P201_ _02" must appear.
Press the ⑬ STDBY key. → "P202_ _05" must appear.
Press the ⑬ STDBY key. → "P201_ _02" must appear.
"P3_ _ _ _0H" must appear on the right 7-segment display.

5) Press the ⑭ EJECT key.
"33…" appears on the left 7-segment display.
(1) Set both search dials to SHUTTLE.
Place both search dials in the center position.
(2) Check that left search dial display varies as shown to the right when turning left search dial clockwise.
Check that display as shown to the right is obtained at fully clockwise rotation.
The same change must appear also in counterclockwise rotation.
(3) Check that turning of right search dial provides the same display change as left search dial.

The right 7-segment display must indicate "0000 0000". (Left half for left search dial, and right half for right search dial.)
0000 → 0001 → 0010 → 0011 → 0100 → 0101 → 0110 → 0111 → 1000

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(4) Set both search dials to JOG.	The right 7-segment display must indicate “00 00”. (Left half for left search dial and right half for right search dial.)
(5) When both search dials is turned Slowly : Quickly :	 The first digit of each display must vary. The second digit of each display must vary.
6) Press the ⑭ EJECT key. “44…” and “232c” appears on the left and right 7-segment displays respectively. Again press the ⑭ EJECT key.	“Error” must appear on the right 7-segment display. (At this time, if pins ③, ④ of CN207 on CPU-3A board are disconnected, then shorted instead, “0H” is displayed.)
7) Press the ⑭ EJECT key twice. “66…” appears on the left 7-segment display.	“0H” must appear on the right 7-segment display.

3-3-2. Backup Function Check in Keyboard

1) Turn OFF the POWER switch.	
2) Turn ON the POWER switch while pressing ② LEARN key and ⑨ A1 key at the same time.	
3) Turn OFF the POWER switch.	
4) About 5 minutes past, turn ON the POWER switch while pressing ② LEARN key and ⑨ A1 key at the same time.	“……” and “XXXXXXXX” must appear on the left and right 7-segment displays respectively.

3-3-3. Bottom Case Check (available only when 7-segment display is active)

Preparation

(1) Mount the connector J-1 of the service tools.
(2) Connect the VIDEO signal to the REF. VIDEO IN terminal.

Procedure

(1) Turn ON the POWER switch while pressing ② [LEARN] key in Fig. 1 and ⑩ [A2] key in Fig. 2 at the same time.
(2) Press ⑭ [EJECT] key in Fig. 2.

"450" and "XX-X" must appear on the left and right 7-segment displays respectively.
01, 02, … appear sequentially on the left 7-segment display, then 09 (the left display) and 01 99 (the right display) must appear. Whenever press the ⑬ [STDBY] key, the following Error code appear sequentially.
09 02 09
09 03 19
09 04 29
09 05 39
09 06 59
09 07 69
09 08 79
09 01 99 Confirm to appear indication.
Press the ⑭ [EJECT] key.
10 01 99 appear. Whenever press the ⑬ [STDBY] key, the following Error code appear sequentially.
10 02 49
10 03 79
10 04 59
10 05 69
10 06 09
10 01 99 Confirm to appear indication.
Press the ⑭ [EJECT] key.
12 01 02 appear.
Confirm to do not appear the change of display with pressing the ⑬ [STDBY] key.
Press the ⑭ [EJECT] key.
"……" must appear on the both display after the beep.

Fault Identification

If a fault is found, operation is stopped immediately.
Display example for faulty place :

Left display :	07	Right display :	01	01
	↓		↓	↓
	STEP		Error No. in STEP	Error code

To confirm whether additional error codes are present in the same step, press the ⑬ [STDBY] key in Fig. 2.
Unchanged error No. in the step indicates there is no additional error in the step.
To proceed to the next step, press the ⑭ [EJECT] key in Fig. 2.
For the meaning of error code, see the Error Code List.

RM-450A Self Check Program Error Code List

Step	Code	Meaning
01	01	ROM Check Sum Error
02	01	RAM Read / Write Error
03	00	CTC1 ch1 Initialize NG
	01	CTC1 ch1 Count Down NG
	02	CTC1 ch1 Timer INT Error
04	00	CTC2 ch3 Initialize NG
	01	CTC2 ch3 Count Down NG
	02	CTC2 ch3 Timer INT Error
05	20	CTC2 ch0 Initialize NG
	21	CTC2 ch1 Initialize NG
06	31	CTC3 ch1 Initialize NG
	33	CTC3 ch3 Initialize NG
		EXT SYNC Check
07	00	CTC1 ch0 Initialize NG
	01	REF. VIDEO IN NG
	02	F2 / F1 (Framing) Pulse Width too Wide
	03	F2 / F1 (Framing) Pulse Width too Narrow
		SIO, R-9P / P-9P REMOTE Check
08	01	chA (Recorder) Tx NG
	02	chA (Recorder) Rx NG (R-TxD → R-RxD Line NG)
	03	chA (Recorder) Data NG (R-TxD → R-RxD Data not equal)
	04	chB (Player) Tx NG
	05	chB (Player) Rx NG (P-TxD → P-RxD Line NG)
	06	chB (Player) Data NG (P-TxD → P-RxD Data not equal)
	07	INT Error
		ROM : IC219 CTC1 : IC225 SIO : IC212
		RAM : IC215 CTC2 : IC224
		CTC3 : IC221
		R (Recorder) 33P S / C, R-33P REMOTE Check
09	90	RESET1 (PW Detect) NG
	98	SYSTEM CLOCK or STROBE NG
09	01	EDIT SAFETY or EDIT LAMP short w / SERIAL IN/OUT
	02	EDIT SAFETY or EDIT LAMP stuck at “H”
	03	EDIT SAFETY or EDIT LAMP short w / REC LAMP or REC KEY
	04	EDIT SAFETY or EDIT LAMP short w / PAUSE LAMP or EDIT KEY
	05	EDIT SAFETY or EDIT LAMP short w / FF KEY & LAMP or FWD/REV
	06	EDIT SAFETY or EDIT LAMP short w / FWD KEY & LAMP or PAUSE KEY
	07	EDIT SAFETY or EDIT LAMP short w / REW KEY & LAMP or FUNC ON
	08	EDIT SAFETY or EDIT LAMP short w / TAPE STOP or CUE OUT or STOP KEY
09	11	REC KEY or REC LAMP short w / SERIAL IN / OUT
	12	REC KEY or REC LAMP stuck at “H”
	13	REC KEY or REC LAMP short w / PAUSE LAMP or EDIT KEY
	14	REC KEY or REC LAMP short w / FF KEY & LAMP or FWD/REV
	15	REC KEY or REC LAMP short w / FWD KEY & LAMP or PAUSE KEY

Step	Code	Meaning
09	16	REC KEY or REC LAMP short w / REW KEY & LAMP or FUNC ON
	17	REC KEY or REC LAMP short w / TAPE STOP or CUE OUT or STOP KEY
	21	EDIT KEY or PAUSE LAMP short w / SERIAL IN / OUT
	22	EDIT KEY or PAUSE LAMP stuck at “H”
	23	EDIT KEY or PAUSE LAMP short w / FF KEY & LAMP or FWD / REV
	24	EDIT KEY or PAUSE LAMP short w / FWD KEY & LAMP or FWD / REV
	25	EDIT KEY or PAUSE LAMP short w / REW KEY & LAMP or PAUSE KEY
	26	EDIT KEY or PAUSE LAMP short w / TAPE STOP or CUE OUT or STOP KEY
		R 33P S / C : IC204
09	31	CUE OUT or TAPE STOP or STOP KEY short w / SERIAL IN/OUT
	32	CUE OUT or TAPE STOP stuck at “H”
	33	CUE OUT or TAPE STOP or STOP KEY short w / FF KEY & LAMP or FWD/REV
	34	CUE OUT or TAPE STOP or STOP KEY short w / FWD KEY & LAMP or PAUSE KEY
	35	CUE OUT or TAPE STOP or STOP KEY short w / REW KEY & LAMP or FUNC ON
09	42	STOP KEY or TAPE STOP stuck at “H”
09	51	PAUSE KEY or FWD KEY & LAMP short w / SERIAL IN/OUT
	52	PAUSE KEY or FWD LAMP stuck at “H”
	53	PAUSE KEY or FWD KEY & LAMP short w / FF KEY & LAMP or FWD/REV
	54	PAUSE KEY or FWD KEY & LAMP short w / REW KEY & LAMP or FUNC ON
09	61	FWD / REV or FF KEY & LAMP short w / SERIAL IN / OUT
	62	FWD / REV or FF LAMP stuck at “H”
	63	FWD / REV or FF KEY & LAMP short w / SERIAL IN / OUT
09	71	REW KEY & LAMP or FUNC ON short w / SERIAL IN / OUT
	72	REW KEY or REW LAMP stuck at “H”
	73	REW KEY short w / REW LAMP or REW LAMP’s CR (470 pF / 1 MΩ) NG
09	82	FF KEY or FF LAMP stuck at “H”
	83	FF KEY short w / FF LAMP or FF LAMP’s CR (470 pF / 1 MΩ) NG
09	92	FWD KEY or FWD LAMP stuck at “H”
	93	FWD KEY short w / FWD LAMP or FWD LAMP’s CR (470 pF / 1 MΩ) NG
09	10	FUNC ON or REW LAMP stuck at “H”
09	20	CTC2 ch0 TRG INT Error or STOP KEY NG
	30	CTC3 ch1 TRG INT Error or SEARCH SPEED NG or CTL IN / OUT NG
		P (Player) 33P S / C, P-33P REMOTE Check
10	90	RESET1 (PW Detect) NG
	98	SYSTEM CLOCK or STROBE NG
10	41	STOP KEY or TAPE STOP or REW KEY & LAMP short w / SERIAL IN / OUT
	42	STOP KEY or TAPE STOP stuck at “H”
	43	STOP KEY or REW LAMP stuck at “H”
	44	STOP KEY or TAPE STOP or REW KEY & LAMP short w / FWD KEY & LAMP or PAUSE KEY
	45	STOP KEY or TAPE STOP or REW KEY & LAMP short w / FF KEY & LAMP or PAUSE KEY
	46	STOP KEY or TAPE STOP or REW KEY & LAMP short w / PAUSE LAMP or FUNC ON
10	51	PAUSE KEY or FWD KEY & LAMP short w / SERIAL IN / OUT
	52	PAUSE KEY or FWD LAMP stuck at “H”
	53	PAUSE KEY or FWD KEY & LAMP short w / FF KEY & LAMP or FWD / REV
	54	PAUSE KEY or FWD KEY & LAMP short w / PAUSE LAMP or FUNC ON

Step	Code	Meaning
10	61	FWD / REV or FF KEY & LAMP short w / SERIAL IN / OUT
	62	FWD / REV or FF LAMP stuck at “H”
	63	FWD / REV or FF KEY & LAMP short w / PAUSE LAMP or FUNC ON
10	72	REW KEY or REW LAMP stuck at “H”
	73	REW KEY short w / REW LAMP or REW LAMP’s CR (470 pF / 1 MΩ) NG
10	82	FF KEY or FF LAMP stuck at “H”
	83	FF KEY short w / FF LAMP or FF LAMP’s CR (470 pF / 1 MΩ) NG
10	92	FWD KEY or FWD LAMP stuck at “H”
	93	FWD KEY short w / FWD LAMP or FF LAMP’s CR (470 pF / 1 MΩ) NG
10	11	FUNC ON or PAUSE LAMP short w / SERIAL IN / OUT
	10	FUNC ON or PAUSE LAMP stuck at “H”
10	20	CTC2 ch1 TRG INT Error
	30	CTC3 ch3 TRG INT Error or SEARCH SPEED NG or CTL IN / OUT NG
		R 33P S / C : IC203
		Daisy Chain (Display according to Priority)
11	00	SIO INT PRIORITY NG
	01	CTC1 NT PRIORITY NG
	02	CTC2 INT PRIORITY NG
	03	CTC3 INT PRIORITY NG
		∗SIO > CTC1 > CTC2 > CTC3
		CUE OUT (Using P 33P S / C for This Check)
12	01	CUE OUT and SLOW LAMP stuck at “H”
13	—	ERROR / KEY BEEP (Check BEEP ON or Not)

Step	Code	Step	Code
09	09	10	09
	19		49
	29		59
	39		69
	59		79
	69		99
	79	12	02
	99		

However if the error codes in above table are displayed, there is no error in this step.
To proceed to the next step, press the ⑭ EJECT key in Fig. 2.

SECTION 4
SPARE PARTS

4-1. NOTES ON SPARE PARTS

(1) Safety Related Components Warning
Components marked ⚠ are critical to safe operation. Therefore, specified parts should be used in the case of replacement.

(2) Standardization of Parts
Spare parts supplied from Sony Parts Center may not be always identical with the parts which actually in use due to “accommodating the improved parts and/or engineering changes” or “standardization of genuine parts”.
This manual’s exploded views and electrical spare parts list are indicating the part numbers of “the standardized genuine parts at present” .

(3) Stock of Parts
Parts marked with “o” SP (Supply Code) column of the spare parts list are not normally required for routine service work. Orders for parts marked with “o” will be processed, but allow for additional delivery time.

(4) Units for Capacitors, Inductors and Resistors
The following units are assumed in schematic diagrams, electrical parts list and exploded views unless otherwise specified.

Capacitors : μF
Inductors : μH
Resistors : Ω

4−1. 補修部品注意事項

(1) 安全重要部品
⚠警告
⚠印のついた部品は安全性を維持するために重要な部品です。したがって，交換する時は必ず指定の部品を使ってください。

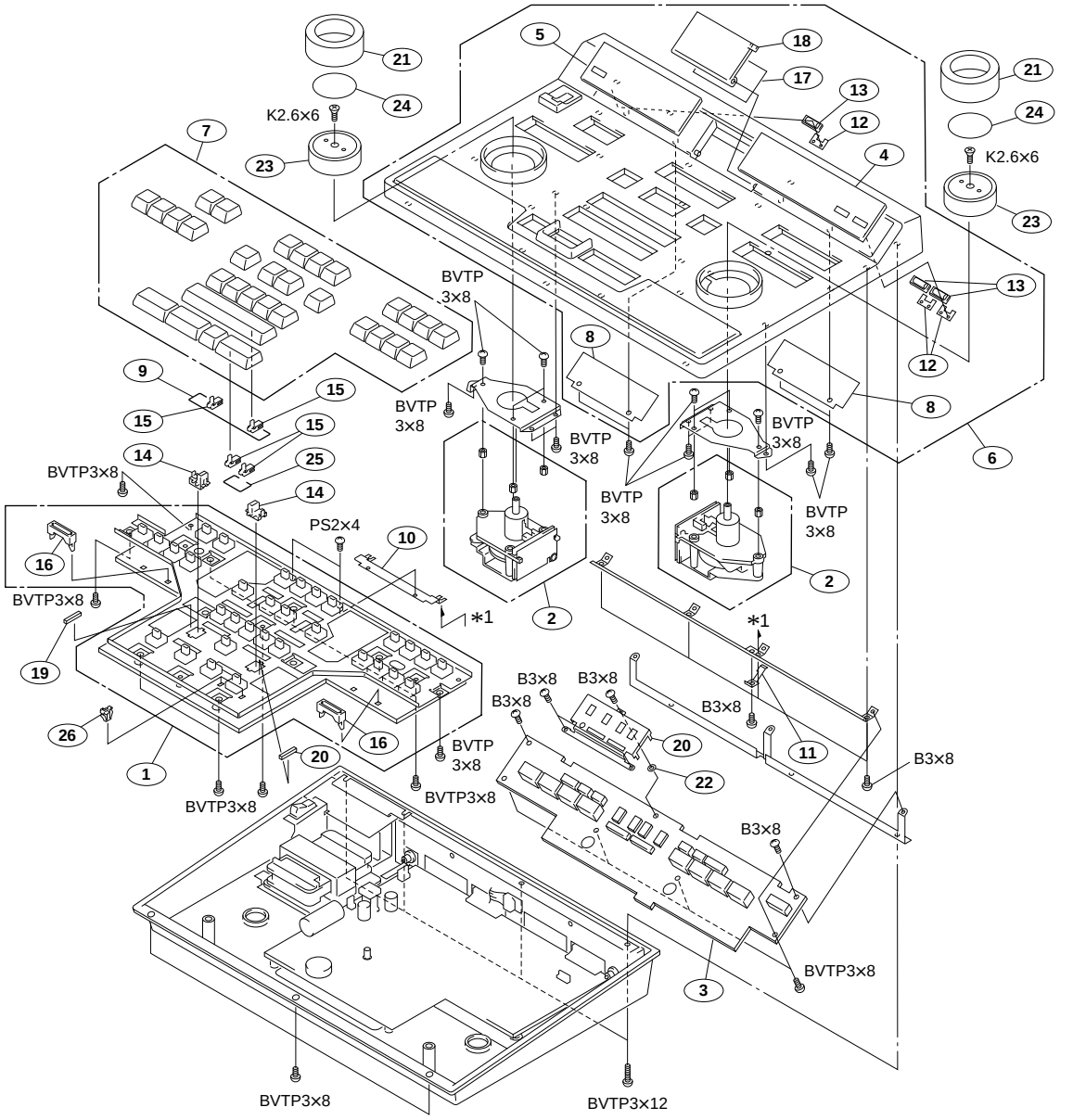
(2) 部品の共通化
ソニーから供給される部品は，セットに実装されているものと異なることがあります。これは部品の共通化，改良等によるものです。
分解図や電気部品表には現時点での共通化された部品が記載されています。

(3) 部品の在庫
部品表のSP (Supply code) 欄に “o” で示される部品は交換頻度が低い部品ですので在庫していないことがあり，納期が長くなることがあります。

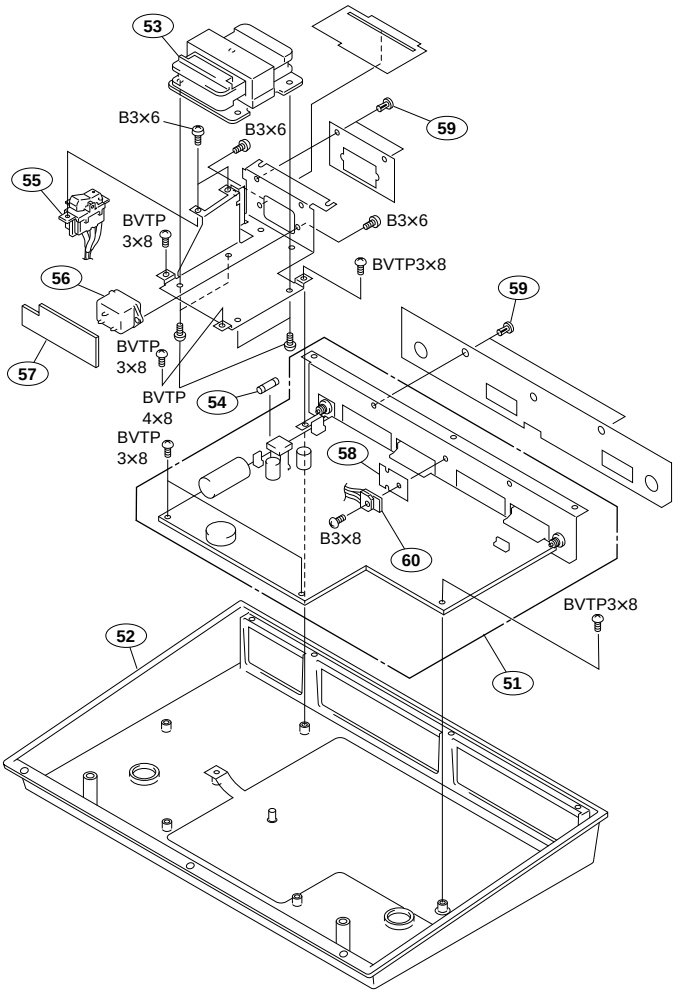
(4) コンデンサ，インダクタ，抵抗の単位
回路図，分解図，電気部品表中，特に明記したものを除き，下記の単位は省略されています。

コンデンサ : μF
インダクタ : μH
抵抗 : Ω

4-2. EXPLODED VIEW



No.	Part No.	SP	Description
1	A-6724-612-A	o	MOUNTED CIRCUIT BOARD, KSW-1
2	A-6734-249-A	s	DIAL ASSY, SEARCH
3	A-8318-742-A	o	MOUNTED CIRCUIT BOARD, DSP-1A
4	X-2284-705-1	o	PLATE (RIGHT) ASSY, TRANSPARENT
5	X-2284-706-1	o	PLATE (LEFT) ASSY, TRANSPARENT
6	X-2284-708-6	o	PANEL SUB ASSY
7	X-2284-709-A	s	KEY SET ASSY
8	2-130-009-01	o	PLATE (S), FILTER
9	2-284-761-01	o	LINK
10	2-284-76S-01	o	PLATE GROUND
11	2-284-765-01	o	SPRING
12	2-284-769-01	o	SPRING
13	2-284-770-01	o	BUTTON
14	2-284-774-01	o	BOSS (LOWER), LINK
15	2-284-777-01	o	BOSS (UPPER), LINK
16	2-284-799-01	o	HOLDER, LED
17	2-284-792-11	o	SHEET, PRESET INDICATION
18	2-284-795-31	o	DOOR
19	2-284-797-01	o	CUSHION
20	3-200-088-01	o	COVER, SWITCH
21	3-668-012-03	s	RUBBER, DIAL KNOB
22	3-701-441-21	s	WASHER
23	3-717-370-01	o	KNOB, DIAL
24	3-717-557-01	o	PLATE, KNOB
25	4-605-532-11	o	LINK
26	4-605-536-01	s	BOSS, GUIDE



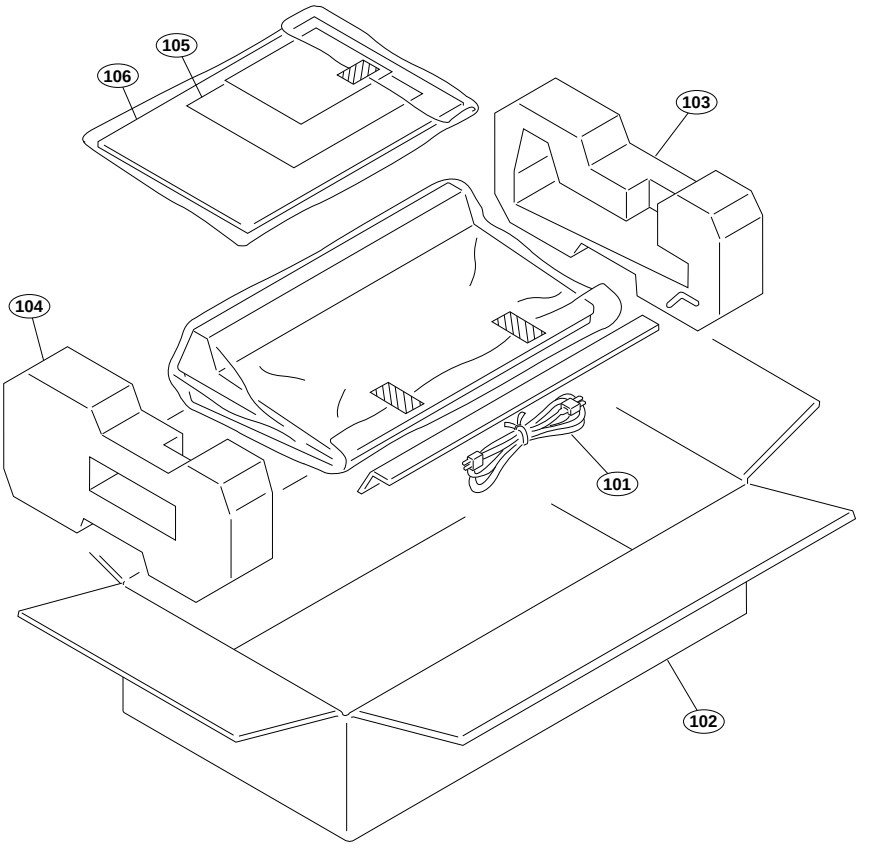
No. Part No. SP Description

51 A-8318-741-A o MOUNTED CIRCUIT OBARD, CPU-3A
52 X-2284-707-1 o CASE SUB ASSY, BOTTOM
53 ⚠ 1-449-178-11 s TRANSFORMER, POWER
54 ⚠ 1-532-259-00 s FUSE, TIME LAG (for CE)
⚠ 1-532-742-11 s FUSE, GLASS TUBE (for J, U)

55 ⚠ 1-570-117-11 s SWITCH, SEESAW (AC POWER)
56 ⚠ 1-580-375-11 s INLET 3P
57 ⚠ 1-625-671-11 o PRINTED CIRCUIT BOARD, AC-1
58 2-284-758-01 o INSULATOR
59 4-812-134-11 s RIVET (DIA. 3.5) NYLON

60 8-749-930-52 s IC SI-3052V

4-3. PACKING MATERIALS AND SUPPLIED ACCESSORIES



No.	Part No.	SP	Description
101	⚠ 1-782-059-11	s	CORD, POEWR (for J)
	⚠ 1-551-812-11	s	CORD, POWER (for U)
	⚠ 1-782-929-11	s	CORD, POWER (for CE)
102	2-284-786-21	o	CARTON
103	2-284-787-01	o	CUSHION (RIGHT)
104	2-284-788-01	o	CUSHION (LEFT)
105	3-862-609-01	s	MANUAL, INSTRUCTION (for J)
	3-862-609-11	s	MANUAL, INSTRUCTION (for U, CE)
106	3-862-610-01	o	CARD (J), ERROR INDICATION (for J)
	3-862-610-11	o	CARD (E), ERROR INDICATION (for U, CE)
	3-862-610-21	o	CARD (F), ERROR INDICATION (for U, CE)
	3-862-610-31	o	CARD (G), ERROR INDICATION (for U, CE)

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4-4. ELECTRICAL PARTS LIST

```
----------
AC-1 BOARD
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Ref. No.
or Q'ty  Part No.    SP Description

1pc     ⚠1-625-671-11 o PRINTED CIRCUIT BOARD,AC-1
```

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CPU-3A BOARD
------------
Ref. No.
or Q'ty  Part No.    SP Description

1pc      A-8318-741-A o MOUNTED CIRCUIT BOARD,CPU-3A
2pcs     1-533-189-11 s HOLDER,FUSE
2pcs     1-562-261-21 o CONNECTOR,COAXIAL,BNC
1pc      2-284-758-01 o INSULATOR

1pc                     SCREW +B 3x8
5pcs                    SCREW +B 3x10
1pc                     LW 3,TYPE B
1pc                     N 3,TYPE 2

BZ201    1-529-025-00 s BUZZER

C201     1-107-887-11 s ELECT    10000uF 20%  16V
C203     1-126-926-11 s ELECT    1000uF  20%  10V
C204     1-131-349-00 s TANTALUM 2.2uF   10%  35V
C207     1-126-096-11 s ELECT    10uF    20%  35V
C214     1-161-494-00 s CERAMIC  0.022uF      25V

C215     1-131-349-00 s TANTALUM 2.2uF   10%  35V
C216     1-126-096-11 s ELECT    10uF    20%  35V
C228     1-130-471-00 s MYLAR    0.001uF  5%  50V
C231     1-126-154-11 s ELECT    47uF    20% 6.3V
C232     1-162-215-31 s CERAMIC  47pF     5%  50V

C235     1-130-471-00 s MYLAR    0.001uF  5%  50V
C236     1-161-494-00 s CERAMIC  0.022uF      25V
C237     1-124-465-00 s ELECT    0.47uF  20%  50V
C238     1-162-207-31 s CERAMIC  22pF     5%  50V
C239     1-161-494-00 s CERAMIC  0.022uF      25V

C240     1-161-494-00 s CERAMIC  0.022uF      25V
C241     1-161-494-00 s CERAMIC  0.022uF      25V
C242     1-161-494-00 s CERAMIC  0.022uF      25V
C243     1-161-494-00 s CERAMIC  0.022uF      25V
C244     1-161-494-00 s CERAMIC  0.022uF      25V

C245     1-161-494-00 s CERAMIC  0.022uF      25V
C246     1-161-494-00 s CERAMIC  0.022uF      25V
C247     1-161-494-00 s CERAMIC  0.022uF      25V
C248     1-161-494-00 s CERAMIC  0.022uF      25V
C249     1-161-494-00 s CERAMIC  0.022uF      25V

C250     1-161-494-00 s CERAMIC  0.022uF      25V
C251     1-130-471-00 s MYLAR    0.001uF  5%  50V
C252     1-162-288-31 s CERAMIC  330pF   10%  50V
C253     1-161-494-00 s CERAMIC  0.022uF      25V
C254     1-130-475-00 s MYLAR 0. 0022uF   5%  50V

C255     1-161-494-00 s CERAMIC  0.022uF      25V
C256     1-161-494-00 s CERAMIC  0.022uF      25V
C257     1-161-494-00 s CERAMIC  0.022uF      25V
C258     1-161-494-00 s CERAMIC  0.022uF      25V
C259     1-161-494-00 s CERAMIC  0.022uF      25V

C260     1-161-494-00 s CERAMIC  0.022uF      25V
C261     1-161-494-00 s CERAMIC  0.022uF      25V
C263     1-161-494-00 s CERAMIC  0.022uF      25V
C264     1-161-494-00 s CERAMIC  0.022uF      25V
C265     1-161-494-00 s CERAMIC  0.022uF      25V

C266     1-161-494-00 s CERAMIC  0.022uF      25V
C267     1-161-494-00 s CERAMIC  0.022uF      25V
C268     1-161-494-00 s CERAMIC  0.022uF      25V
C269     1-161-494-00 s CERAMIC  0.022uF      25V
C270     1-161-494-00 s CERAMIC  0.022uF      25V
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(CPU-3A BOARD)

Ref. No. or Q'ty	Part No.	SP	Description
C271	1-161-494-00	s	CERAMIC 0.022uF 25V
C272	1-161-494-00	s	CERAMIC 0.022uF 25V
C274	1-162-285-31	s	CERAMIC 180pF 10% 50V
C275	1-162-285-31	s	CERAMIC 180pF 10% 50V
C276	1-162-285-31	s	CERAMIC 180pF 10% 50V
C277	1-162-285-31	s	CERAMIC 180pF 10% 50V
CN203	1-563-770-11	o	SOCKET,D-SUB CONNECTOR 9P
CN205	1-563-770-11	o	SOCKET,D-SUB CONNECTOR 9P
CN207	1-564-005-11	o	CONNECTOR 6P,MALE
CN208	1-580-837-11	o	PIN,CONNECTOR(PC BOARD) 3P
CN209	1-508-742-00	s	PIN,CONNECTOR 3P
CNI219	1-526-659-00	o	SOCKET,IC 28P
CNI223	1-526-662-21	o	SOCKET,IC 40P
D204	8-719-110-39	s	DIODE RD15ESB1
D209	8-719-911-19	s	DIODE 1SS119
D212	8-719-911-19	s	DIODE 1SS119
D215	8-719-504-60	s	DIODE S4VB60
D216	8-719-911-19	s	DIODE 1SS119
D217	8-719-812-41	s	LED TLR124,RED
D219	8-719-812-41	s	LED TLR124,RED
D220	8-719-911-19	s	DIODE 1SS119
D221	8-719-120-78	s	DIODE HZS6.2NB1TD
DB210	1-233-154-11	s	COMPOSITION CIRCUIT BLOCK
IC205	8-759-900-38	s	IC SN74LS38N
IC206	8-759-916-54	s	IC SN74HC174AN
IC207	8-759-942-38	s	IC SN75ALS192N
IC208	8-759-926-32	s	IC AM26LS32PC
IC209	8-759-000-01	s	IC MC74HC4538N
IC210	8-759-917-18	s	IC TC74HCU04AP
IC211	8-759-917-38	s	IC SN74HC4040AN
IC212	8-759-916-84	s	IC LH0084A
IC213	8-759-922-95	s	IC MSM82C51ARS
IC214	8-759-000-01	s	IC MC74HC4538N
IC215	8-759-168-70	s	IC CY7C185-25PC
IC216	8-759-917-43	s	IC SN74HC138AN
IC217	8-759-242-05	s	IC TC74HC4024AP
IC218	8-759-729-03	s	IC NJM2903D
IC219	8-759-349-78	s	IC MBM27C256-RM450V1.8
IC220	8-759-916-25	s	IC SN74HC32AN
IC221	8-759-996-53	s	IC Z84C3006PEC
IC222	8-759-032-81	s	IC SN74HC74AN
IC223	8-759-916-80	s	IC LH0080A
IC224	8-759-996-53	s	IC Z84C3006PEC
IC225	8-759-996-53	s	IC Z84C3006PEC
IC226	8-759-913-42	s	IC PST520C-2
IC227	8-749-930-52	s	IC SI-3052V
Q201	8-729-620-02	s	TRANSISTOR 2SA1115-F
Q202	8-729-620-02	s	TRANSISTOR 2SA1115-F
Q203	8-729-119-78	s	TRANSISTOR 2SC2603-E
R236	1-249-439-11	s	CARBON 68K 5% 1/4W
R237	1-249-425-11	s	CARBON 4.7K 5% 1/4W
R238	1-249-437-11	s	CARBON 47K 5% 1/4W
R239	1-249-417-11	s	CARBON 1K 5% 1/4W
R241	1-249-421-11	s	CARBON 2.2K 5% 1/4W
R242	1-249-441-11	s	CARBON 100K 5% 1/4W
R243	1-249-421-11	s	CARBON 2.2K 5% 1/4W
R245	1-249-421-11	s	CARBON 2.2K 5% 1/4W

(CPU-3A BOARD)

Ref. No. or Q'ty	Part No.	SP	Description
R250	1-249-441-11	s	CARBON 100K 5% 1/4W
R254	1-249-434-11	s	CARBON 27K 5% 1/4W
R256	1-249-437-11	s	CARBON 47K 5% 1/4W
R257	1-249-429-11	s	CARBON 10K 5% 1/4W
R258	1-249-425-11	s	CARBON 4.7K 5% 1/4W
R259	1-247-903-00	s	CARBON 1M 5% 1/4W
R260	1-249-427-11	s	CARBON 6.8K 5% 1/4W
R261	1-249-418-11	s	CARBON 1.2K 5% 1/4W
R262	1-249-422-11	s	CARBON 2.7K 5% 1/4W
R263	1-249-429-11	s	CARBON 10K 5% 1/4W
R264	1-249-419-11	s	CARBON 1.5K 5% 1/4W
R265	1-249-419-11	s	CARBON 1.5K 5% 1/4W
R266	1-247-807-31	s	CARBON 100 5% 1/4W
R267	1-249-419-11	s	CARBON 1.5K 5% 1/4W
R268	1-247-807-31	s	CARBON 100 5% 1/4W
R269	1-249-419-11	s	CARBON 1.5K 5% 1/4W
R270	1-247-891-00	s	CARBON 330K 5% 1/4W
R271	1-249-425-11	s	CARBON 4.7K 5% 1/4W
R272	1-249-425-11	s	CARBON 4.7K 5% 1/4W
R273	1-247-863-91	s	CARBON 22K 5% 1/4W
R274	1-249-425-11	s	CARBON 4.7K 5% 1/4W
R275	1-249-441-11	s	CARBON 100K 5% 1/4W
R276	1-249-429-11	s	CARBON 10K 5% 1/4W
R277	1-249-429-11	s	CARBON 10K 5% 1/4W
R278	1-249-441-11	s	CARBON 100K 5% 1/4W
R279	1-249-429-11	s	CARBON 10K 5% 1/4W
R280	1-247-804-11	s	CARBON 75 5% 1/4W
R281	1-249-429-11	s	CARBON 10K 5% 1/4W
R282	1-249-429-11	s	CARBON 10K 5% 1/4W
R287	1-249-429-11	s	CARBON 10K 5% 1/4W
R288	1-249-429-11	s	CARBON 10K 5% 1/4W
R289	1-249-429-11	s	CARBON 10K 5% 1/4W
R290	1-249-429-11	s	CARBON 10K 5% 1/4W
RB208	1-235-724-11	s	RESISTOR BLOCK 10Kx8
RB209	1-235-736-11	s	RESISTOR BLOCK 100Kx8
RB210	1-235-720-11	s	RESISTOR BLOCK 4.7Kx8
S201	1-570-623-11	s	SWITCH,DIP 8-CKT
X201	1-579-530-11	s	VIBRATOR,CERAMIC 4.915MHz

DSP-1A BOARD

Ref. No. or Q'ty	Part No.	SP	Description
1pc	A-8318-742-A	o	MOUNTED CIRCUIT BOARD,DSP-1A
4pcs	2-284-768-01	o	SPACER(SMALL)
3pcs	2-284-767-01	o	SPACER(LARGE)
C501	1-161-494-00	s	CERAMIC 0.022uF 25V
C502	1-161-494-00	s	CERAMIC 0.022uF 25V
C503	1-162-303-11	s	CERAMIC 0.0033uF 20% 16V
C504	1-162-303-11	s	CERAMIC 0.0033uF 20% 16V
CN501	1-506-491-11	s	CONNECTOR,12P,MALE
CN502	1-506-491-11	s	CONNECTOR,12P,MALE
D501	8-719-066-21	s	DIODE LB-402VA
D502	8-719-066-21	s	DIODE LB-402VA
D503	8-719-066-21	s	DIODE LB-402VA
D504	8-719-066-21	s	DIODE LB-402VA
D505	8-719-066-21	s	DIODE LB-402VA
D506	8-719-066-21	s	DIODE LB-402VA
D507	8-719-066-21	s	DIODE LB-402VA
D508	8-719-066-21	s	DIODE LB-402VA
D509	8-719-901-47	s	LED LT-9010D,RED
D510	8-719-970-34	s	DIODE LT-9002E
D511	8-719-970-34	s	DIODE LT-9002E
D512	8-719-970-34	s	DIODE LT-9002E
D513	8-719-970-34	s	DIODE LT-9002E
D514	8-719-901-47	s	LED LT-9010D,RED
D515	8-719-970-33	s	DIODE LT-9010E
D516	8-719-911-19	s	DIODE 1SS119
D517	8-719-911-19	s	DIODE 1SS119
D518	8-719-911-19	s	DIODE 1SS119
D519	8-719-911-19	s	DIODE 1SS119
D520	8-719-911-19	s	DIODE 1SS119
D521	8-719-911-19	s	DIODE 1SS119
D522	8-719-911-19	s	DIODE 1SS119
D523	8-719-911-19	s	DIODE 1SS119
D524	8-719-911-19	s	DIODE 1SS119
D525	8-719-911-19	s	DIODE 1SS119
D526	8-719-911-19	s	DIODE 1SS119
D527	8-719-911-19	s	DIODE 1SS119
D528	8-719-911-19	s	DIODE 1SS119
D529	8-719-911-19	s	DIODE 1SS119
D530	8-719-911-19	s	DIODE 1SS119
D531	8-719-911-19	s	DIODE 1SS119
D532	8-719-911-19	s	DIODE 1SS119
D533	8-719-911-19	s	DIODE 1SS119
D534	8-719-911-19	s	DIODE 1SS119
D535	8-719-911-19	s	DIODE 1SS119
D536	8-719-911-19	s	DIODE 1SS119
D537	8-719-911-19	s	DIODE 1SS119
D538	8-719-911-19	s	DIODE 1SS119
D539	8-719-911-19	s	DIODE 1SS119
D540	8-719-911-19	s	DIODE 1SS119
D541	8-719-911-19	s	DIODE 1SS119
D542	8-719-911-19	s	DIODE 1SS119
D543	8-719-911-19	s	DIODE 1SS119
D544	8-719-911-19	s	DIODE 1SS119
D545	8-719-911-19	s	DIODE 1SS119
IC501	8-759-515-12	s	IC SN74ALS574BNS
IC502	8-759-515-12	s	IC SN74ALS574BNS

(DSP-1A BOARD)

Ref. No. or Q'ty	Part No.	SP	Description
R501	1-249-401-11	s	CARBON 47 5% 1/4W
R502	1-249-401-11	s	CARBON 47 5% 1/4W
R503	1-249-401-11	s	CARBON 47 5% 1/4W
R504	1-249-401-11	s	CARBON 47 5% 1/4W
R505	1-249-401-11	s	CARBON 47 5% 1/4W
R506	1-249-401-11	s	CARBON 47 5% 1/4W
R507	1-249-401-11	s	CARBON 47 5% 1/4W
R508	1-249-401-11	s	CARBON 47 5% 1/4W
R509	1-249-401-11	s	CARBON 47 5% 1/4W
R510	1-249-401-11	s	CARBON 47 5% 1/4W
R511	1-249-401-11	s	CARBON 47 5% 1/4W
R512	1-249-401-11	s	CARBON 47 5% 1/4W
R513	1-249-401-11	s	CARBON 47 5% 1/4W
R514	1-249-401-11	s	CARBON 47 5% 1/4W
R515	1-249-395-11	s	CARBON 15 5% 1/4W
R516	1-249-393-11	s	CARBON 10 5% 1/4W
S501	1-553-856-00	s	SWITCH,PUSH
S502	1-571-534-11	s	SWITCH,KEY BOARD
S503	1-553-856-00	s	SWITCH,PUSH
S504	1-553-856-00	s	SWITCH,PUSH
S505	1-570-056-11	s	SWITCH,SLIDE
S507	1-570-056-11	s	SWITCH,SLIDE
S508	1-570-056-11	s	SWITCH,SLIDE
S509	1-570-056-11	s	SWITCH,SLIDE
S511	1-570-623-11	s	SWITCH,DIP 8-CKT
S512	1-570-623-11	s	SWITCH,DIP 8-CKT

KSW-1 BOARD

Ref. No. or Q'ty	Part No.	SP	Description
1pc	A-6724-612-A	o	MOUNTED CIRCUIT BOARD,KSW-1
2pcs	2-284-799-01	o	HOLDER,LED
4pcs			SCREW +B 3x6
C301	1-163-038-91	s	CERAMIC,CHIP 0.1uF 25V
C302	1-131-351-00	s	TANTALUM 4.7uF 10% 35V
C303	1-163-038-91	s	CERAMIC,CHIP 0.1uF 25V
C304	1-104-905-11	s	DOUBLE LAYERS 0.22FARAD 5.5V
C305	1-163-038-91	s	CERAMIC,CHIP 0.1uF 25V
C306	1-163-038-91	s	CERAMIC,CHIP 0.1uF 25V
C307	1-124-589-11	s	ELECT 47uF 20% 16V
C308	1-124-589-11	s	ELECT 47uF 20% 16V
C309	1-163-038-91	s	CERAMIC,CHIP 0.1uF 25V
C310	1-124-589-11	s	ELECT 47uF 20% 16V
C311	1-163-104-00	s	CERAMIC,CHIP 30pF 5% 50V
C312	1-163-104-00	s	CERAMIC,CHIP 30pF 5% 50V
C313	1-124-589-11	s	ELECT 47uF 20% 16V
C314	1-163-104-00	s	CERAMIC,CHIP 30pF 5% 50V
C315	1-163-104-00	s	CERAMIC,CHIP 30pF 5% 50V
C316	1-163-038-91	s	CERAMIC,CHIP 0.1uF 25V
C317	1-163-031-11	s	CERAMIC,CHIP 0.01uF 50V
C318	1-163-031-11	s	CERAMIC,CHIP 0.01uF 50V
C319	1-163-031-11	s	CERAMIC,CHIP 0.01uF 50V
C320	1-163-031-11	s	CERAMIC,CHIP 0.01uF 50V
C321	1-163-031-11	s	CERAMIC,CHIP 0.01uF 50V
CN304	1-506-485-11	s	CONNECTOR,6P,MALE
CN305	1-506-485-11	s	CONNECTOR,6P,MALE
D301	8-719-914-43	s	DIODE DAN202K-T-147
D302	8-719-914-43	s	DIODE DAN202K-T-147
D303	8-719-914-43	s	DIODE DAN202K-T-147
D304	8-719-914-43	s	DIODE DAN202K-T-147
D305	8-719-914-43	s	DIODE DAN202K-T-147
D306	8-719-914-43	s	DIODE DAN202K-T-147
D307	8-719-914-43	s	DIODE DAN202K-T-147
D308	8-719-914-43	s	DIODE DAN202K-T-147
D309	8-719-914-43	s	DIODE DAN202K-T-147
D310	8-719-914-43	s	DIODE DAN202K-T-147
D311	8-719-914-43	s	DIODE DAN202K-T-147
D312	8-719-914-43	s	DIODE DAN202K-T-147
D313	8-719-914-43	s	DIODE DAN202K-T-147
D314	8-719-914-43	s	DIODE DAN202K-T-147
D315	8-719-914-43	s	DIODE DAN202K-T-147
D316	8-719-914-43	s	DIODE DAN202K-T-147
D317	8-719-914-43	s	DIODE DAN202K-T-147
D318	8-719-914-43	s	DIODE DAN202K-T-147
D319	8-719-914-43	s	DIODE DAN202K-T-147
D320	8-719-914-43	s	DIODE DAN202K-T-147
D321	8-719-914-43	s	DIODE DAN202K-T-147
D322	8-719-914-43	s	DIODE DAN202K-T-147
D323	8-719-914-43	s	DIODE DAN202K-T-147
D324	8-719-914-43	s	DIODE DAN202K-T-147
D325	8-719-914-43	s	DIODE DAN202K-T-147
D326	8-719-914-43	s	DIODE DAN202K-T-147
D327	8-719-914-43	s	DIODE DAN202K-T-147
D329	8-719-914-43	s	DIODE DAN202K-T-147
D330	8-719-914-43	s	DIODE DAN202K-T-147
D331	8-719-914-43	s	DIODE DAN202K-T-147

(KSW-1 BOARD)

Ref. No. or Q'ty	Part No.	SP	Description
D333	8-719-914-43	s	DIODE DAN202K-T-147
D334	8-719-946-52	s	DIODE GL8EG22
D335	8-719-981-55	s	DIODE GL8HD22
D336	8-719-946-52	s	DIODE GL8EG22
D337	8-719-946-52	s	DIODE GL8EG22
D338	8-719-981-55	s	DIODE GL8HD22
D339	8-719-946-52	s	DIODE GL8EG22
IC301	8-759-631-31	s	IC M50747E-108SP
IC302	8-759-937-29	s	IC MB88201H-539N
IC303	8-759-937-29	s	IC MB88201H-539N
IC304	8-759-600-68	s	IC M54562P
IC305	8-759-600-61	s	IC M54529AP
IC306	8-759-913-42	s	IC PST520C-2
Q301	8-729-030-02	s	TRANSISTOR DTC144ES
Q302	8-729-620-02	s	TRANSISTOR 2SA1115-F
Q303	8-729-030-02	s	TRANSISTOR DTC144ES
R301	1-216-073-00	s	METAL,CHIP 10K 5% 1/10W
R302	1-216-073-00	s	METAL,CHIP 10K 5% 1/10W
R303	1-216-073-00	s	METAL,CHIP 10K 5% 1/10W
R304	1-216-073-00	s	METAL,CHIP 10K 5% 1/10W
R305	1-216-061-00	s	METAL,CHIP 3.3K 5% 1/10W
R306	1-216-089-91	s	METAL,CHIP 47K 5% 1/10W
R307	1-216-073-00	s	METAL,CHIP 10K 5% 1/10W
R308	1-216-073-00	s	METAL,CHIP 10K 5% 1/10W
R309	1-216-049-91	s	METAL,CHIP 1K 5% 1/10W
R310	1-216-073-00	s	METAL,CHIP 10K 5% 1/10W
R311	1-216-097-91	s	METAL,CHIP 100K 5% 1/10W
R312	1-216-057-00	s	METAL,CHIP 2.2K 5% 1/10W
R313	1-216-057-00	s	METAL,CHIP 2.2K 5% 1/10W
R316	1-249-397-11	s	CARBON 22 5% 1/4W
R317	1-249-397-11	s	CARBON 22 5% 1/4W
R318	1-249-397-11	s	CARBON 22 5% 1/4W
R319	1-216-073-00	s	METAL,CHIP 10K 5% 1/10W
R320	1-216-073-00	s	METAL,CHIP 10K 5% 1/10W
R321	1-216-073-00	s	METAL,CHIP 10K 5% 1/10W
R322	1-216-073-00	s	METAL,CHIP 10K 5% 1/10W
R323	1-216-073-00	s	METAL,CHIP 10K 5% 1/10W
R324	1-216-073-00	s	METAL,CHIP 10K 5% 1/10W
R325	1-216-073-00	s	METAL,CHIP 10K 5% 1/10W
R326	1-216-073-00	s	METAL,CHIP 10K 5% 1/10W
R327	1-216-073-00	s	METAL,CHIP 10K 5% 1/10W
RB301	1-235-355-11	s	RESISTOR BLOCK 10Kx4
RB303	1-235-355-11	s	RESISTOR BLOCK 10Kx4
RB305	1-235-724-11	s	RESISTOR BLOCK 10Kx8
RB306	1-235-724-11	s	RESISTOR BLOCK 10Kx8
S301	1-571-505-11	s	SWITCH,KEY BOARD
S302	1-571-505-11	s	SWITCH,KEY BOARD
S303	1-571-505-11	s	SWITCH,KEY BOARD
S304	1-571-505-11	s	SWITCH,KEY BOARD
S305	1-571-505-11	s	SWITCH,KEY BOARD
S306	1-571-505-11	s	SWITCH,KEY BOARD
S307	1-571-505-11	s	SWITCH,KEY BOARD
S308	1-571-505-11	s	SWITCH,KEY BOARD
S309	1-571-505-11	s	SWITCH,KEY BOARD
S310	1-571-505-11	s	SWITCH,KEY BOARD

(KSW-1 BOARD)

Ref. No. or Q'ty	Part No.	SP	Description
S311	1-571-505-11	s	SWITCH,KEY BOARD
S312	1-571-505-11	s	SWITCH,KEY BOARD
S313	1-571-505-11	s	SWITCH,KEY BOARD
S314	1-571-505-11	s	SWITCH,KEY BOARD
S315	1-571-505-11	s	SWITCH,KEY BOARD
S316	1-571-505-11	s	SWITCH,KEY BOARD
S317	1-571-505-11	s	SWITCH,KEY BOARD
S318	1-571-505-11	s	SWITCH,KEY BOARD
S319	1-571-505-11	s	SWITCH,KEY BOARD
S320	1-571-505-11	s	SWITCH,KEY BOARD
S321	1-571-505-11	s	SWITCH,KEY BOARD
S322	1-571-505-11	s	SWITCH,KEY BOARD
S323	1-571-505-11	s	SWITCH,KEY BOARD
S324	1-571-505-11	s	SWITCH,KEY BOARD
S325	1-571-505-11	s	SWITCH,KEY BOARD
S326	1-571-505-11	s	SWITCH,KEY BOARD
S327	1-571-505-11	s	SWITCH,KEY BOARD
S328	1-571-505-11	s	SWITCH,KEY BOARD
S329	1-571-505-11	s	SWITCH,KEY BOARD
S330	1-571-505-11	s	SWITCH,KEY BOARD
S331	1-571-505-11	s	SWITCH,KEY BOARD
S332	1-571-505-11	s	SWITCH,KEY BOARD
X301	1-579-530-11	s	VIBRATOR,CERAMIC 4.915MHz
X302	1-567-192-31	s	OSCILLATOR,CERAMIC 4MHz
X303	1-567-192-31	s	OSCILLATOR,CERAMIC 4MHz

PTC-32 BOARD

Ref. No. or Q'ty	Part No.	SP	Description
C1	1-124-228-11	s	ELECT 22uF 20% 10V
IC1	8-719-939-50	s	PHOTINTERRUPTE GP1L52
IC2	8-719-939-50	s	PHOTINTERRUPTE GP1L52
IC3	8-719-940-86	s	PHOTINTERRUPTE GP1L53
IC4	8-719-939-50	s	PHOTINTERRUPTE GP1L52
IC5	8-759-133-90	s	IC UPC339C
R1	1-247-823-31	s	CARBON 470 5% 1/4W
R2	1-247-823-31	s	CARBON 470 5% 1/4W
R3	1-247-847-31	s	CARBON 4.7K 5% 1/4W
R4	1-247-839-31	s	CARBON 2.2K 5% 1/4W
R5	1-247-855-31	s	CARBON 10K 5% 1/4W
R6	1-247-823-31	s	CARBON 470 5% 1/4W
R7	1-247-855-31	s	CARBON 10K 5% 1/4W
R8	1-247-847-31	s	CARBON 4.7K 5% 1/4W
R9	1-247-823-31	s	CARBON 470 5% 1/4W
R10	1-247-847-31	s	CARBON 4.7K 5% 1/4W

SECTION 5
SEMICONDUCTOR PIN ASSIGNMENTS

Semiconductors of which functions are equivalent are described here. For parts replacement, refer to the section of Spare Parts in this manual. The circuit diagram of each IC is obtained from the IC data book published by the manufacturer.

ここに記載されている半導体は，それぞれの機能を等価的に表したものです。　なお，互換性のない型名を併記していることがありますので，部品を交換するときは，Spare Partsの章を参照してください。
等価回路はICメーカーのデータブックに従いました。

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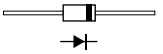
DIODE



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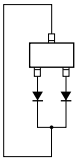
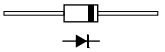
1SS119-25TD
HZS6.2NB1TD
RD6.2ESL3

—TOP VIEW—



DAN202K
DAN202K-T-147



HZS15NB1TD
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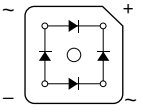
—BOTTOM VIEW—



S2VB20
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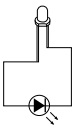
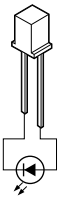
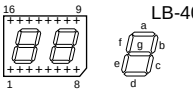


GL3PR8 ; RED

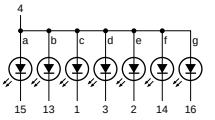


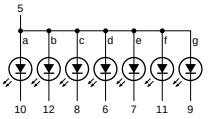
GL8EG22 ; GREEN
GL8HD22 ; RED

—TOP VIEW—

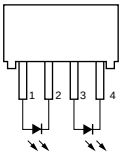


LB-402VA ; RED

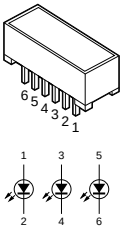




—SIDE VIEW—

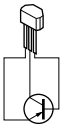


LT-9002E



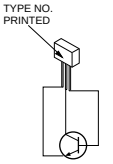
LT-9010D
LT-9010E

TRANSISTOR

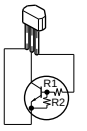


2SA1115-F

TYPE NO. PRINTED

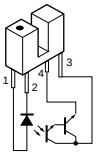


2SC2785-F
2SC2785-HFE



DTC144ES
(R1, R2=47 K)

OTHERS

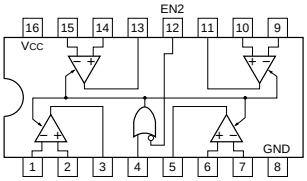


GP1L52
GP1L53

IC

AM26LS32PC (ADVANCED MICRO DEVICES)

HIGH SPEED DIFFERENTIAL LINE RECEIVER
—TOP VIEW—



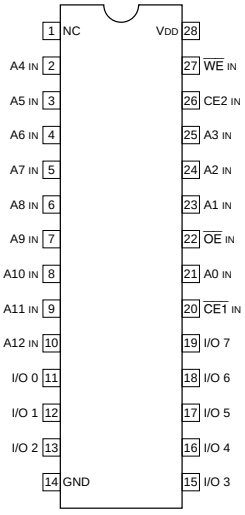
FUNCTION TABLE		
EN2	EN1	OUTPUT
0	0	ENABLE
0	1	ENABLE
1	0	HI-Z
1	1	ENABLE

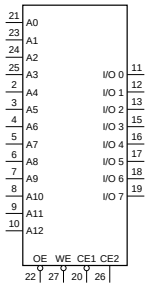
0 : LOW LEVEL
1 : HIGH LEVEL
HI-Z : HIGH IMPEDANCE

	SENSE	INPUT VOLT
C32/LS32	±200mV	±7 V
LS33	±500mV	±15 V

CY7C185-25PC (CYPRESS)

C-MOS (8192-WORD × 8)-BIT HIGH SPEED STATIC RAM
—TOP VIEW—

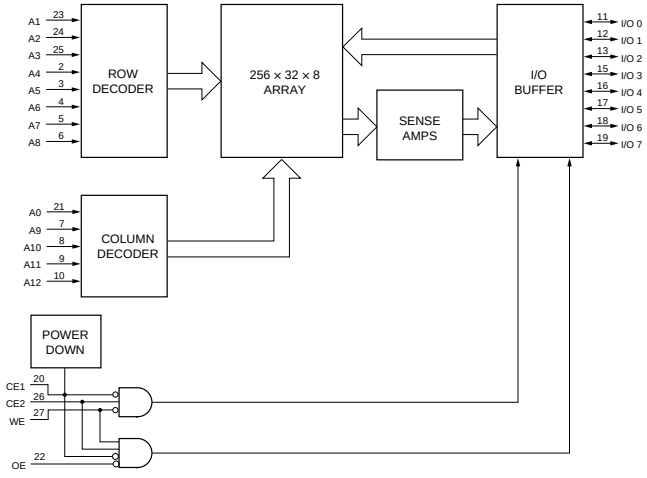




A0 - A12 : ADDRESS INPUTS
CE1, CE2 : CHIP ENABLE INPUT
I/O 0 - I/O 7 : DATA INPUTS/OUTPUTS
OE : OUTPUT ENABLE INPUT
WE : WRITE ENABLE INPUT

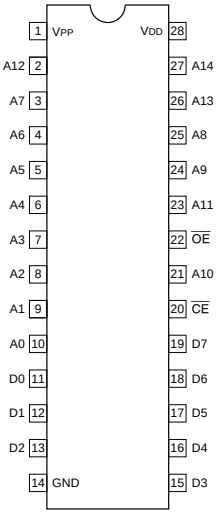
CE1	CE2	OE	WE	MODE	I/O TERMINAL
1	×	×	×	NOT SELECT	HI-Z
×	0	×	×	NOT SELECT	HI-Z
0	1	1	1	OUTPUT DISABLE	HI-Z
0	1	0	1	READ	OUTPUT DATA
0	1	×	0	WRITE	INPUT DATA

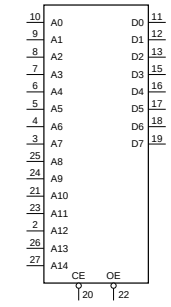
0 : LOW LEVEL
1 : HIGH LEVEL
× : DON'T CARE
HI-Z : HIGH IMPEDANCE

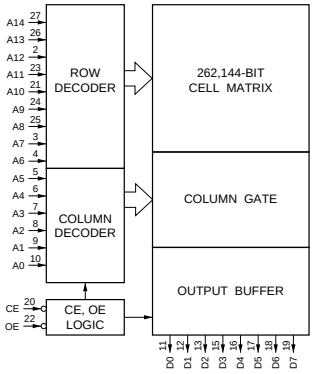


M27C256B-12F1 (SGS)

C-MOS 256 K (32 K × 8)-BIT ONE TIME PROM WITH 3-STATE OUTPUTS
—TOP VIEW—







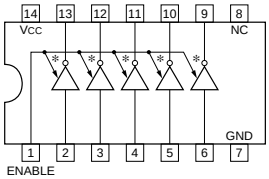
A0 - A14 : ADDRESS INPUT
CE : CHIP ENABLE
D0 - D7 : DATA OUTPUT
OE : OUTPUT ENABLE
VPP : PROGRAM POWER SUPPLY

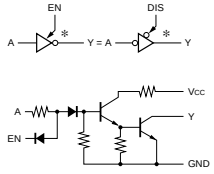
An	CE	OE	VDD	VPP	Dn	FUNCTION
An	0	0	+5 V	+5 V	D	READ
×	0	1	+5 V	+5 V	HI-Z	OUTPUT DISABLE
An	1	×	+5 V	+5 V	HI-Z	STANDBY
An	0	1	+6 V	+12.5 V	D	PGM
An	1	0	+6 V	+12.5 V	D	PGM VERIFY
×	1	1	+6 V	+12.5 V	HI-Z	PGM INH

0 : LOW LEVEL
1 : HIGH LEVEL
× : DON'T CARE
HI-Z : HIGH IMPEDANCE

M54529AP (MITSUBISHI)

TRANSISTOR ARRAY
—TOP VIEW—





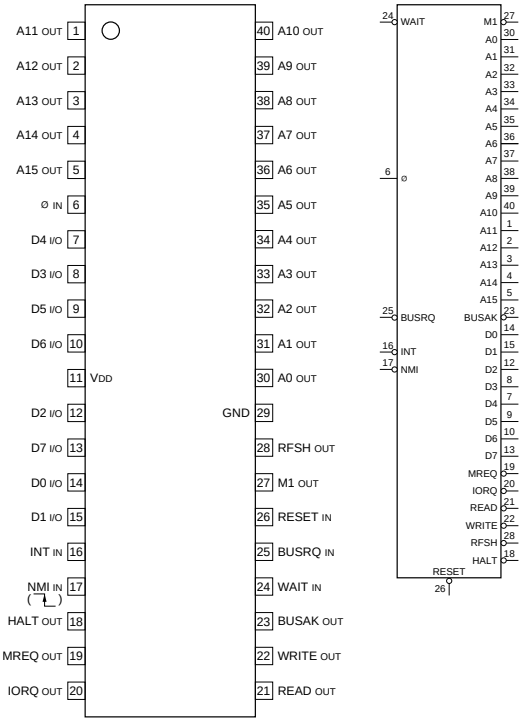
A	EN	Y
0	1	1
1	1	0
×	0	1

0 : LOW LEVEL
1 : HIGH LEVEL
× : DON'T CARE
✻ : OPEN COLLECTOR

LH0080A (SHARP)

N-MOS 8-BIT MICROPROCESSOR

—TOP VIEW—



INPUT

BUSRQ : BUS REQUEST
INT : INTERRUPT REQUEST
NMI : NON-MASKABLE INTERRUPT (DOWN EDGE TRIGGER)
Ø : CLOCK

OUTPUT

A0 - A15 : 3-STATE ADDRESS
BUSAK : BUS ACKNOWLEDGE
HALT : HALT STATE
IORQ : 3-STATE I/O REQUEST
M1 : MACHINE CYCLE 1
MREQ : 3-STATE MEMORY REQUEST
READ : 3-STATE MEMORY READ
RFSH : REFRESH
WRITE : 3-STATE MEMORY WRITE

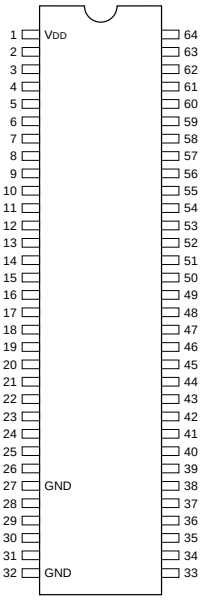
INPUT/OUTPUT

D0 - D7 : 3-STATE DATA

M50747E-108SP

C-MOS PROCESS 8-BIT ONE CHIP MICROCOMPUTER

—TOP VIEW—



INPUT

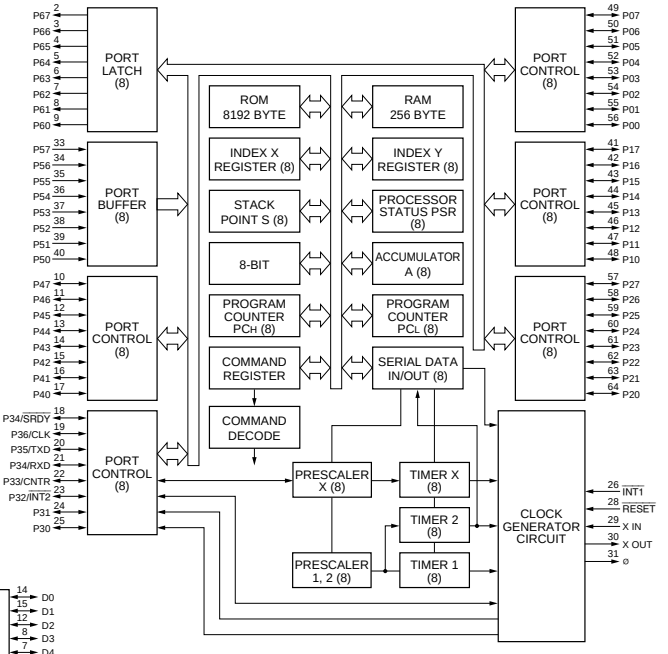
INT1 : INTERRUPT1
P50 - P57 : PORT 5
RESET : RESET

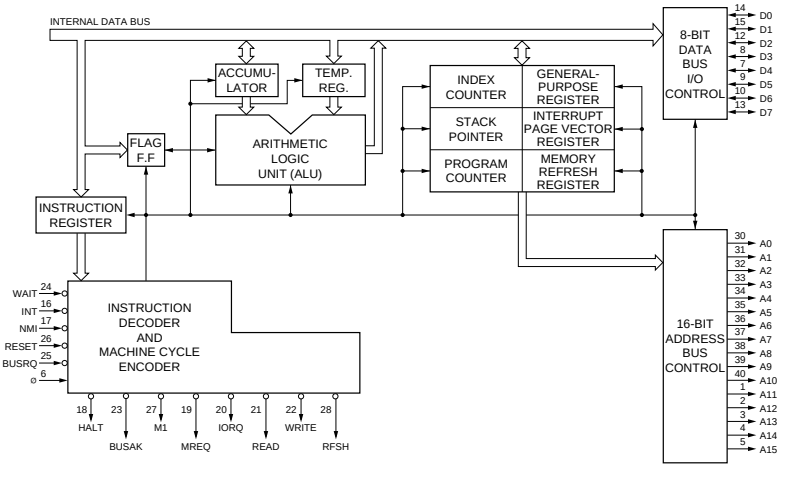
OUTPUT

P60 - P67 : PORT 6
Ø : CLOCK TIMING

INPUT/OUTPUT

P00 - P07 : PORT 0
P10 - P17 : PORT 1
P20 - P27 : PORT 2
P30 - P37 : PORT 3
P32/INT2 : PORT/INTTERUPT2
P33/CNTR : PORT/CONTROL
P34/RXD : RECEIVED DATA
P35/TXD : TRANCEMITTED DATA
P36/CLK : PORT/CLOCK
P37/SRDY : SIRIAL IN READY
P40 - P47 : PORT 4
X IN/OUT : CLOCK


PORT LATCH (8)
PORT BUFFER (8)
PORT CONTROL (8)
PORT CONTROL (8)
PORT CONTROL (8)
PORT CONTROL (8)
ROM 8192 BYTE
RAM 256 BYTE
INDEX X REGISTER (8)
INDEX Y REGISTER (8)
STACK POINT S (8)
PROCESSOR STATUS PSR (8)
8-BIT
ACCUMULATOR A (8)
PROGRAM COUNTER PCH (8)
PROGRAM COUNTER PCL (8)
COMMAND REGISTER
SERIAL DATA IN/OUT (8)
COMMAND DECODE
PRESCALER X (8)
TIMER X (8)
TIMER 2 (8)
PRESCALER 1, 2 (8)
TIMER 1 (8)
CLOCK GENERATOR CIRCUIT
P67 P66 P65 P64 P63 P62 P61 P60
P57 P56 P55 P54 P53 P52 P51 P50
P47 P46 P45 P44 P43 P42 P41 P40
P34/SRDY P36/CLK P35/TXD P34/RXD P33/CNTR P32/INT2 P31 P30
P07 P06 P05 P04 P03 P02 P01 P00
P17 P16 P15 P14 P13 P12 P11 P10
P27 P26 P25 P24 P23 P22 P21 P20
INT1 RESET X IN X OUT Ø


INTERNAL DATA BUS
ACCUMU-LATOR
TEMP. REG.
FLAG F.F
ARITHMETIC LOGIC UNIT (ALU)
INDEX COUNTER
GENERAL-PURPOSE REGISTER
STACK POINTER
INTERRUPT PAGE VECTOR REGISTER
PROGRAM COUNTER
MEMORY REFRESH REGISTER
8-BIT DATA BUS I/O CONTROL
INSTRUCTION REGISTER
INSTRUCTION DECODER AND MACHINE CYCLE ENCODER
16-BIT ADDRESS BUS CONTROL
WAIT INT NMI RESET BUSRQ Ø
HALT BUSAK M1 MREQ IORQ READ WRITE RFSH
D0 D1 D2 D3 D4 D5 D6 D7
A0 A1 A2 A3 A4 A5 A6 A7 A8 A9 A10 A11 A12 A13 A14 A15

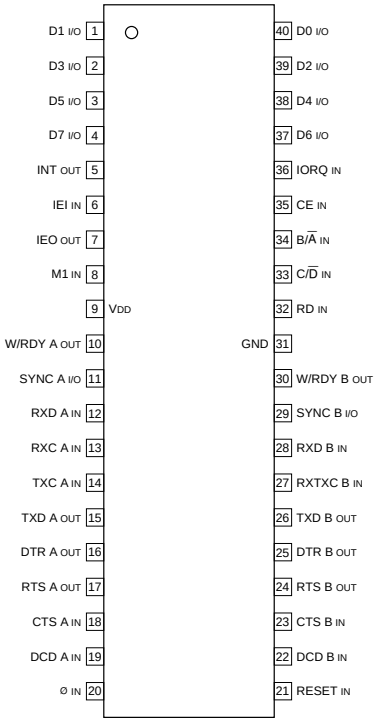
TEMP. REG. : TEMPORARY REGISTER

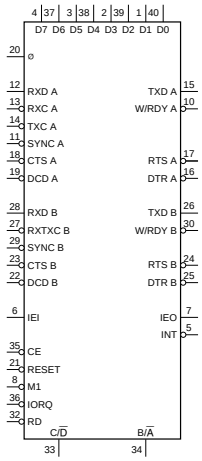
http://getMANUAL.com

LH0084A (SHARP)

N-MOS 2-CHANNEL SERIAL INPUT/OUTPUT FOR MICROCOMPUTER SYSTEM

—TOP VIEW—

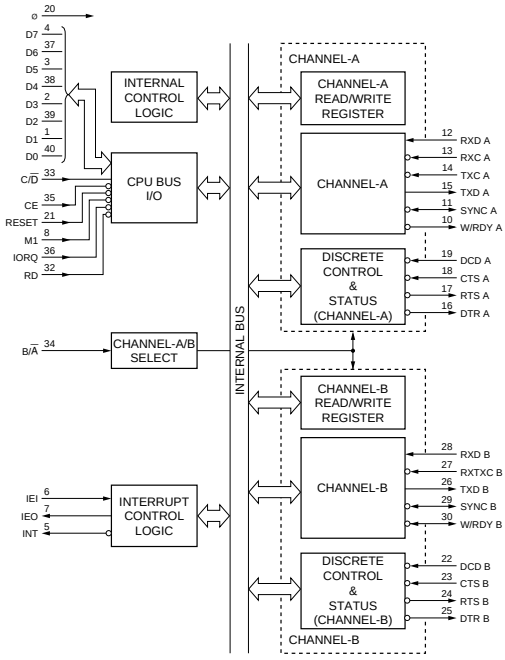




CHANNEL SELECT
FANCTION TABLE

C/D	B/A	FUNCTION
0	0	CH-A DATA
0	1	CH-B DATA
1	0	CH-A CONT. WORD
1	1	CH-B CONT. WORD

0 : LOW LEVEL
1 : HIGH LEVEL



INPUT

B/$\overline{A}$: CHANNEL B/A SELECT
C/$\overline{D}$: CONTROL/DATA SELECT
CE : CHIP ENABLE
CTS : CLEAR TO SEND
DCD : DATA CARRIER DETECT
IEI : INTERRUPT ENABLE
IORQ : I/O REQUEST
M1 : MACHINE CYCLE 1
RD : READ
RXC : RECEIVE CLOCK
RXD : RECEIVE DATA
TXC : TRANSMIT CLOCK
Ø : SYSTEM CLOCK

OUTPUT

DTR : DATA TERMINAL READY
IEO : INTERRUPT ENABLE
INT : INTERRUPT
RTS : REQUEST TO SEND
TXD : TRANSMIT DATA
W/RDY : WAIT/READY

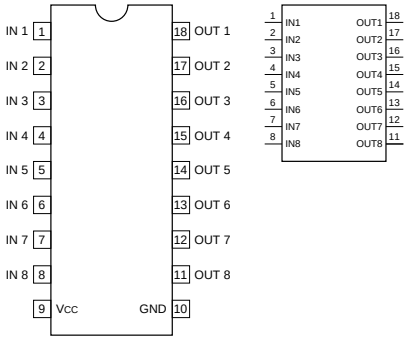
INPUT/OUTPUT

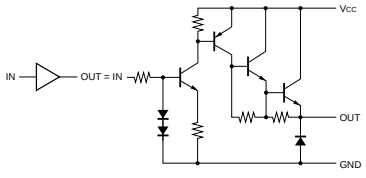
D7 - D0 : DATA BUS (3-STATE)
SYNC : EXTERNAL CHARACTER SYNCHRONIZATION

M54562P (MITSUBISHI)

SOURCE TYPE DARLINGTON TRANSISTOR ARRAY

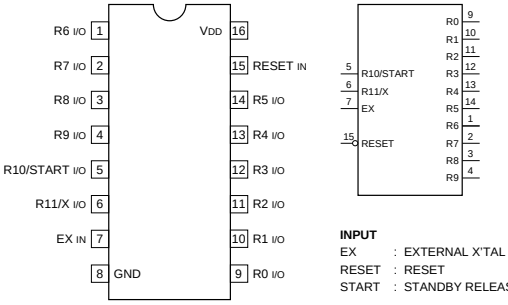
—TOP VIEW—





MB88201H-539N (FUJITSU)

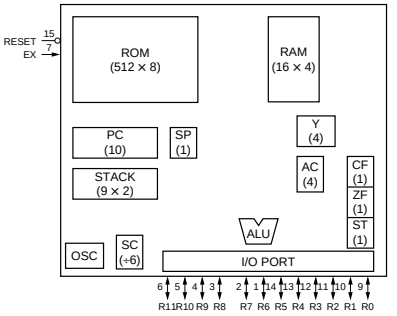
C-MOS 4-BIT MICROCOMPUTER
—TOP VIEW—



INPUT
EX : EXTERNAL X'TAL
RESET : RESET
START : STANDBY RELEASE

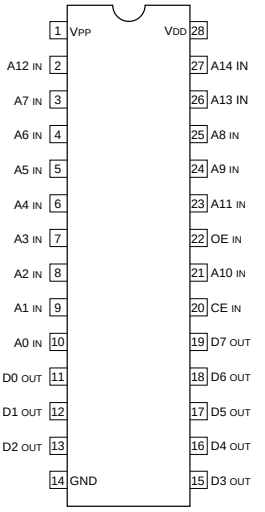
OUTPUT
R11/X : EXT CLOCK IN/INT CLOCK

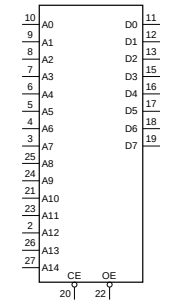
INPUT/OUTPUT
R0 - R11 : I/O PORT (R)

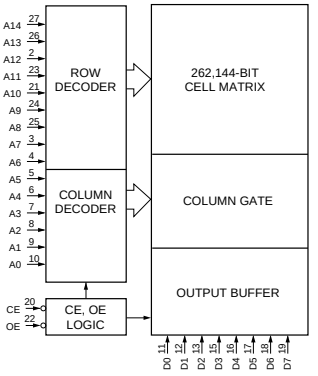


MBM27C256-RM450V1.8 (FUJITSU)

C-MOS 256 K (32 K × 8)-BIT UV ERASABLE PROM WITH 3-STATE OUTPUTS
—TOP VIEW—







A0 - A14 : ADDRESS INPUTS
$\overline{CE}$: CHIP ENABLE INPUT
D0 - D7 : DATA OUTPUTS
$\overline{OE}$: OUTPUT ENABLE INPUT
VPP : PROGRAM POWER SUPPLY

An	CE	OE	VDD	VPP	Dn	FUNCTION
An	0	0	+5 V	+5 V	D OUT	READ
An	0	1	+5 V	+5 V	HI-Z	OUTPUT DISABLE
×	1	×	+5 V	+5 V	HI-Z	STANDBY
An	0	1	+6 V	+12.5 V	D IN	PGM
An	1	0	+6 V	+12.5 V	D OUT	PGM VERIFY (1)
An	0	0	+6 V	+12.5 V	D OUT	PGM VERIFY (2)
×	1	1	+6 V	+12.5 V	HI-Z	PGM INH
AO	0	0	+5 V	+5 V	DEVICE CODE	ELECTRONIC SIGNATURE*

0 : LOW LEVEL
1 : HIGH LEVEL
× : DON'T CARE
HI-Z : HIGH IMPEDANCE

* SEE FOLLOWING DESCRIPTION

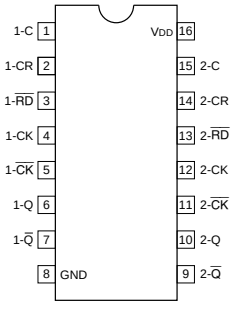
ELECTRONIC SIGNATURE FOR P ROM WRITER
ADDRESS SETTINGS IN READ MODE

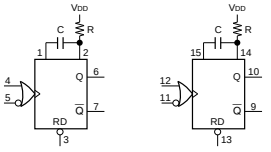
A1 - A8	A9	A10 - A13	A14, Vpp
0	12 V	0	1

	AO	CODE DATA								
		D7	D6	D5	D4	D3	D2	D1	D0	
MAKER CODE	0	0	0	0	0	0	1	0	0	04H
DEVICE CODE	1	0	1	1	0	0	0	1	0	62H

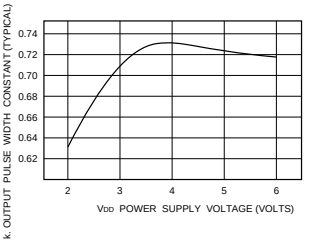
MC74HC4538N (MOTOROLA)
TC74HC4538AP

C-MOS DUAL RETRIGGERABLE/NON-RETRIGGERABLE MONOSTABLE MULTIVIBRATOR
—TOP VIEW—

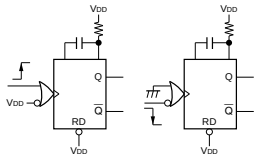




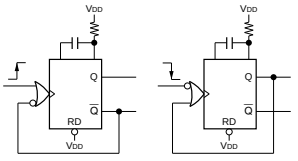
OUTPUT PULSE WIDTH = k • C • R



RETRIGGERABLE M. M. V

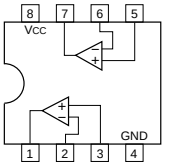


NON-RETRIGGERABLE M. M. V



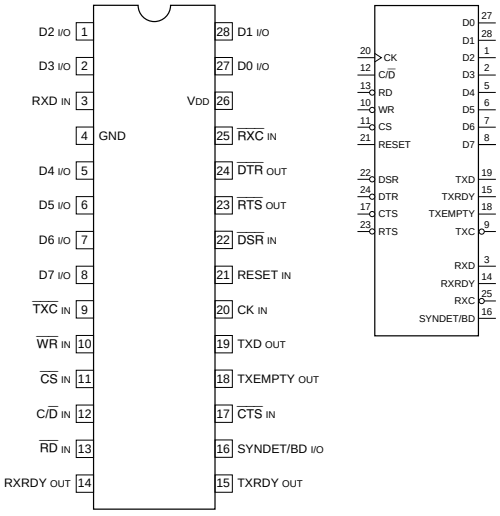
NJM2903D (JRC)

DUAL VOLTAGE COMPARATORS
—TOP VIEW—



MSM82C51ARS (OKI)
MSM82C51A-2RS

C-MOS PROGRAMMABLE COMMUNICATION INTERFACE
—TOP VIEW—



OPERATION WITH CPU

CS	C/D	RD	WR	FUNCTION
1	×	×	×	DATA BUS 3-STATE
0	×	1	1	DATA BUS 3-STATE
0	1	0	1	STATUS TO CPU
0	1	1	0	CONTROL WORD FROM CPU
0	0	0	1	DATA TO CPU
0	0	1	0	DATA FROM CPU

0 : LOW LEVEL
1 : HIGH LEVEL
× : DON'T CARE
HI-Z : HIGH IMPEDANCE

INPUT

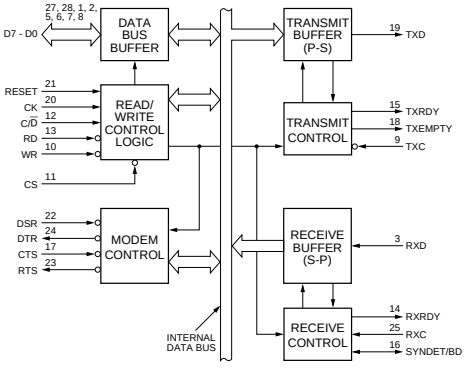
CK	: CLOCK SIGNAL
CS	: CHIP ENABLE
CTS	: CLEAR TO SEND DATA
C/D	: DATA, COMMAND WORD OR STATUS WORD IS TO BE WRITTEN OR READ
DSR	: DATA SET READY
RD	: READ DATA OR STATUS WORD
RESET	: RESET BY HIGH LEVEL
RXC	: RECEIVING CLOCK
RXD	: RECEIVING DATA
TXC	: TRANSMITTING CLOCK
WR	: WRITE DATA OR CONTROL WORD

OUTPUT

DTR	: DATA TERMINAL READY
RTS	: REQUEST TO SEND DATA
RXRDY	: RECEIVING READY
TXD	: TRANSMITTING DATA
TXEMPTY	: TRANSMITTING CHARACTER EMPTY
TXRDY	: TRANSMITTING READY

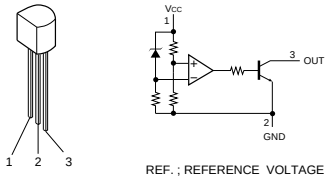
INPUT/OUTPUT

D0 - D7	: DATA
SYNDET/BD	: SYNC DETECT/BREAK DETECT



PST520C-2 (MITSUMI)

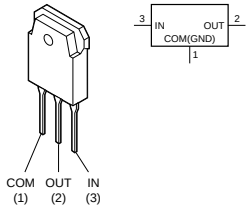
SYSTEM RESETTING DEVICE



REF. ; REFERENCE VOLTAGE

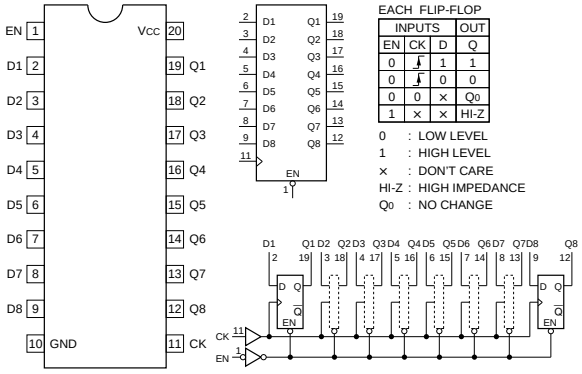
SI-3052V (SANKEN)

POSITIVE VOLTAGE REGULATOR (2 A)
—TOP VIEW—



SN74ALS574BNS (TI)FLAT PACKAGE

TTL 3-STATE D-TYPE EDGE-TRIGGERED FLIP-FLOP
—TOP VIEW—



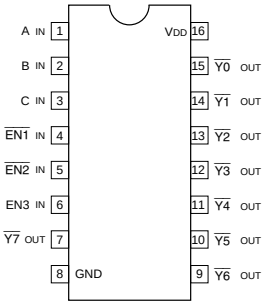
EACH FLIP-FLOP

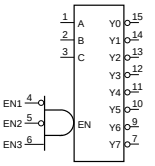
INPUTS			OUT
EN	CK	D	Q
0	↑	1	1
0	↑	0	0
0	0	×	Q_0
1	×	×	HI-Z

0 : LOW LEVEL
1 : HIGH LEVEL
× : DON'T CARE
HI-Z : HIGH IMPEDANCE
Q_0 : NO CHANGE

SN74HC138AN (TI)

C-MOS 3-TO-8 LINE DECODER/DEMULTIPLEXER
—TOP VIEW—





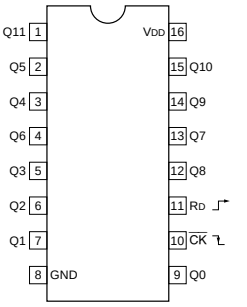
INPUTS				OUTPUTS							
EN	C	B	A	Y7	Y6	Y5	Y4	Y3	Y2	Y1	Y0
0	×	×	×	1	1	1	1	1	1	1	1
1	0	0	0	1	1	1	1	1	1	1	0
1	0	0	1	1	1	1	1	1	1	0	1
1	0	1	0	1	1	1	1	1	0	1	1
1	0	1	1	1	1	1	1	0	1	1	1
1	1	0	0	1	1	1	0	1	1	1	1
1	1	0	1	1	1	0	1	1	1	1	1
1	1	1	0	1	0	1	1	1	1	1	1
1	1	1	1	0	1	1	1	1	1	1	1

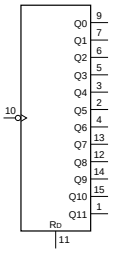
EN = $\overline{EN1} \cdot \overline{EN2} \cdot EN3$

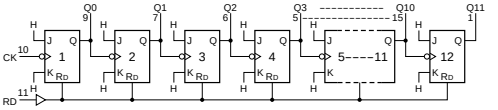
0 : LOW LEVEL
1 : HIGH LEVEL
× : DON'T CARE

SN74HC4040AN (TI)

C-MOS 12-STAGE RIPPLE CARRY BINARY COUNTER/DRIVER
—TOP VIEW—







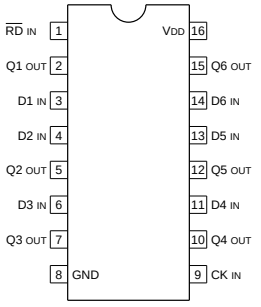
COUNT	Q11	Q10	Q9	Q8	Q7	Q6	Q5	Q4	Q3	Q2	Q1	Q0
0	0	0	0	0	0	0	0	0	0	0	0	0
1	0	0	0	0	0	0	0	0	0	0	0	1
2	0	0	0	0	0	0	0	0	0	0	1	0
3	0	0	0	0	0	0	0	0	0	0	1	1
4095	1	1	1	1	1	1	1	1	1	1	1	1

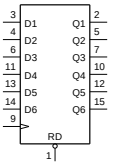
RD	Q11--------Q0
1	ALL LOW
0	COUNT

0 : LOW LEVEL
1 : HIGH LEVEL

SN74HC174AN (TI)

C-MOS D-TYPE FLIP-FLOP WITH RESET
—TOP VIEW—

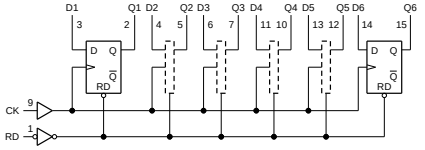




EACH FLIP-FLOP

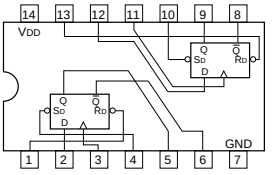
INPUTS			OUT
RD	CK	D	Q
0	×	×	0
1	↑	0	0
1	↑	1	1
1	0	×	Q_0

0 : LOW LEVEL
1 : HIGH LEVEL
× : DON'T CARE



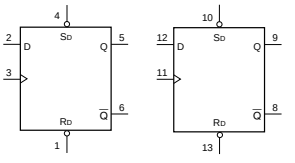
SN74HC74AN (TI)

C-MOS DUAL D-TYPE FLIP-FLOPS WITH DIRECT SET/RESET
—TOP VIEW—



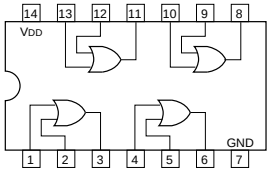
INPUTS				OUTPUTS	
$\overline{SD}$	$\overline{RD}$	CK	D	Qn+1	$\overline{Qn+1}$
0	1	×	×	1	0
1	0	×	×	0	1
0	0	×	×	1	1
1	1	↑	1	1	0
1	1	↑	0	0	1
1	1	0	×	Qn	$\overline{Qn}$

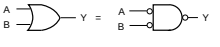
0 : LOW LEVEL
1 : HIGH LEVEL
× : DON'T CARE



SN74HC32AN (TI)

C-MOS QUAD 2-INPUT OR GATES
—TOP VIEW—





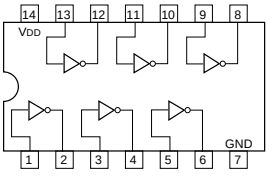
$Y = A + B = \overline{\overline{A} \cdot \overline{B}}$

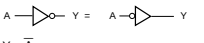
A	B	Y
0	0	0
0	1	1
1	0	1
1	1	1

0 : LOW LEVEL
1 : HIGH LEVEL

SN74HCU04AN (TI)
TC74HCU04AP

C-MOS HEX INVERTERS
—TOP VIEW—





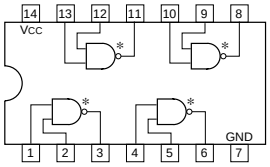
$Y = \overline{A}$

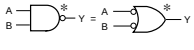
A	Y
0	1
1	0

0 : LOW LEVEL
1 : HIGH LEVEL

SN74LS38N (TI)

TTL 2-INPUT POSITIVE-NAND GATE BUFFER
WITH OPEN-COLLECTOR
—TOP VIEW—





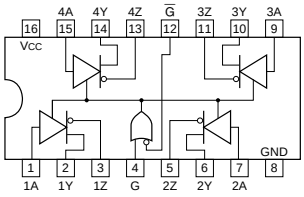
$Y = \overline{A \cdot B} = \overline{A} + \overline{B}$

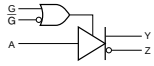
A	B	Y
0	0	1
0	1	1
1	0	1
1	1	0

0 : LOW LEVEL
1 : HIGH LEVEL
✻ : OPEN COLLECTOR

SN75ALS192N (TI)

QUAD. DIFERENTIAL LINE DRIVER
—TOP VIEW—



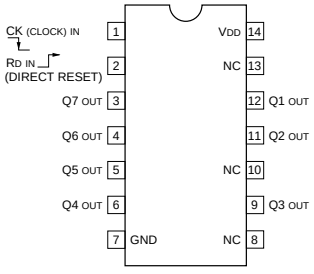


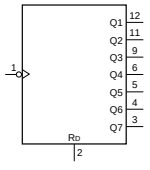
INPUT	ENABLES		OUTPUT	
A	G	$\overline{G}$	Y	Z
H	H	×	H	L
L	H	×	L	H
H	×	L	H	L
L	×	L	L	H
×	L	H	HI-Z	HI-Z

H : HIGH LEVEL
L : LOW LEVEL
× : DON'T CARE
HI-Z : HIGH IMPEDANCE

TC74HC4024AP (TOSHIBA)

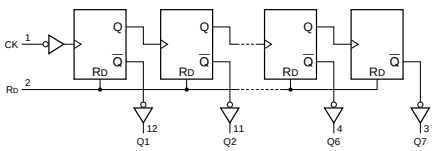
C-MOS ASYNCHRONOUS 7-BIT BINARY COUNTER
—TOP VIEW—





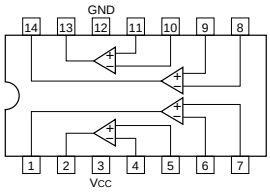
COUNT	INPUTS		OUTPUTS						
	CK	RD	Q7	Q6	Q5	Q4	Q3	Q2	Q1
0	×	1	0	0	0	0	0	0	0
1	↓	0	0	0	0	0	0	0	1
2	↓	0	0	0	0	0	0	1	0
3	↓	0	0	0	0	0	0	1	1
4	↓	0	0	0	0	0	1	0	0
125	↓	0	1	1	1	1	1	0	1
126	↓	0	1	1	1	1	1	1	0
127	↓	0	1	1	1	1	1	1	1
—	O	0	NO CHANGE						
—	I	0							

0 : LOW LEVEL
1 : HIGH LEVEL
× : DON'T CARE



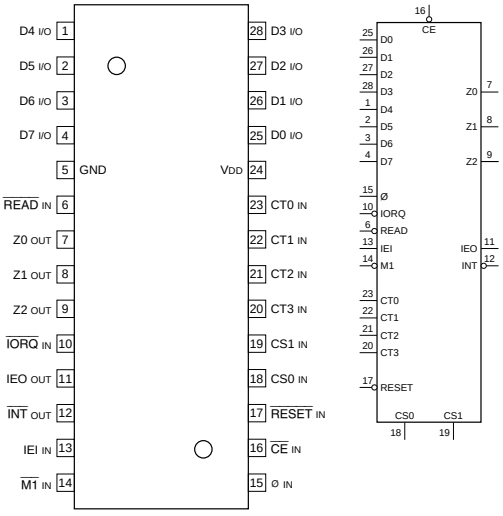
UPC339C (NEC)

QUAD COMPARATORS
—TOP VIEW—



Z84C3006PEC (ZILOG)

C-MOS COUNTER TIMER CIRCUIT
—TOP VIEW—



INPUT
CE : CHIP ENABLE
CS0, CS1 : CHANNEL SELECT
CT0 - CT3 : EXTERNAL CLOCK/TIMER TRIGGER
IEI : INTERRUPT ENABLE
M1 : MACHINE CYCLE 1
Ø : SYSTEM CLOCK

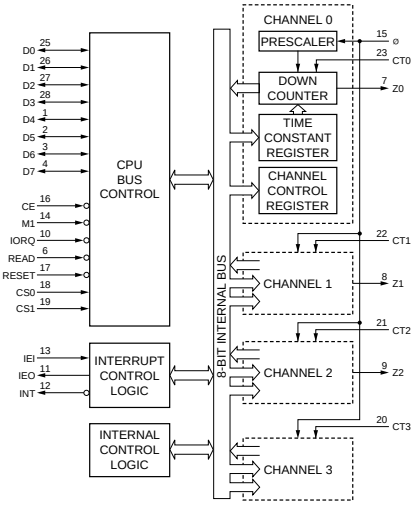
OUTPUT
IEO : INTERRUPT ENABLE
INT : INTERRUPT REQUEST (OPEN DRAIN)

INPUT/OUTPUT
D0 - D7 : 3-STATE DATA
IORQ : I/O REQUEST
READ : READ CYCLE STATUS

CHANNEL SELECT FUNCTION

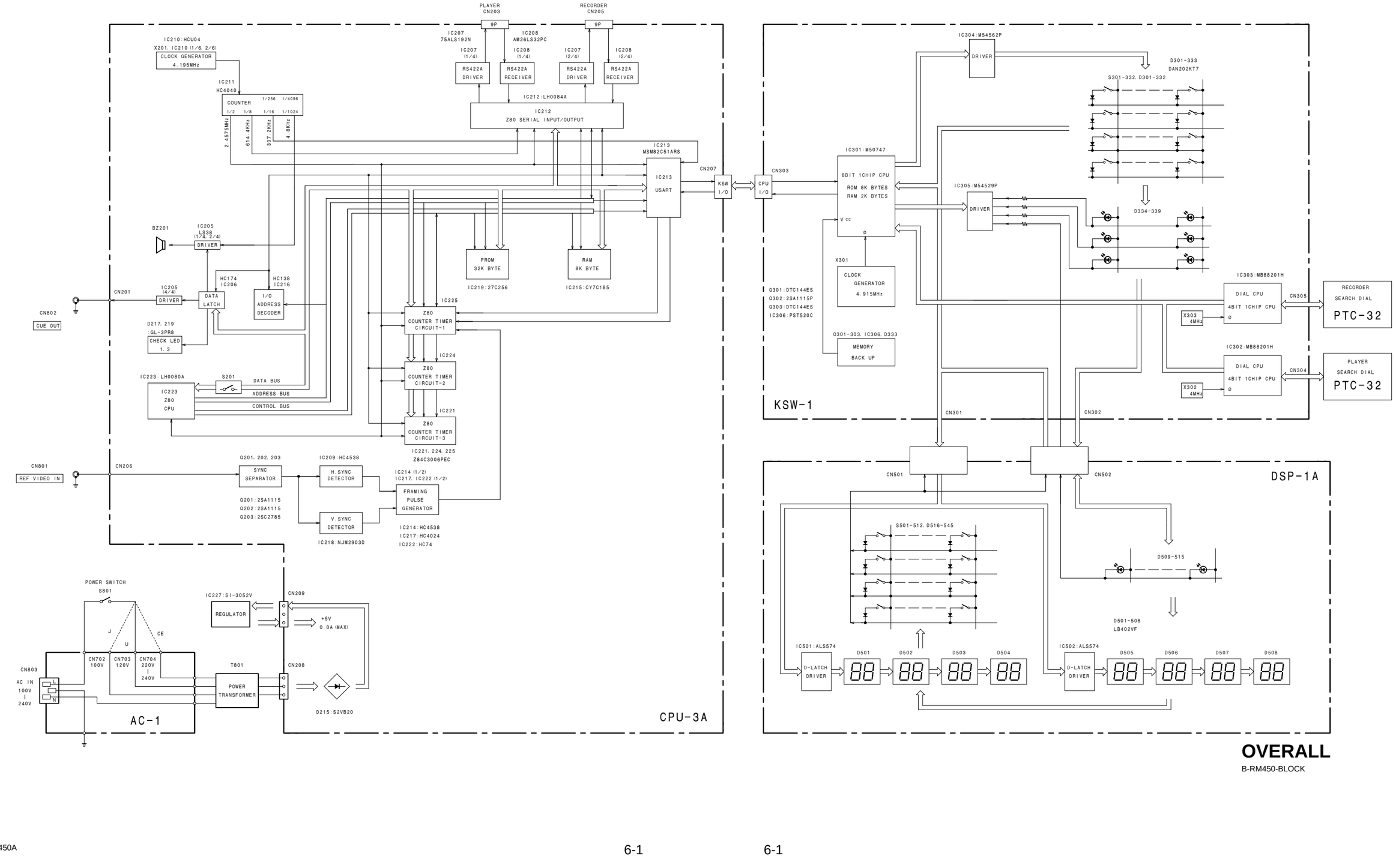
CS1	CS0	SELECTED CHANNEL
0	0	0
0	1	1
1	0	2
1	1	3

0 : LOW LEVEL
1 : HIGH LEVEL



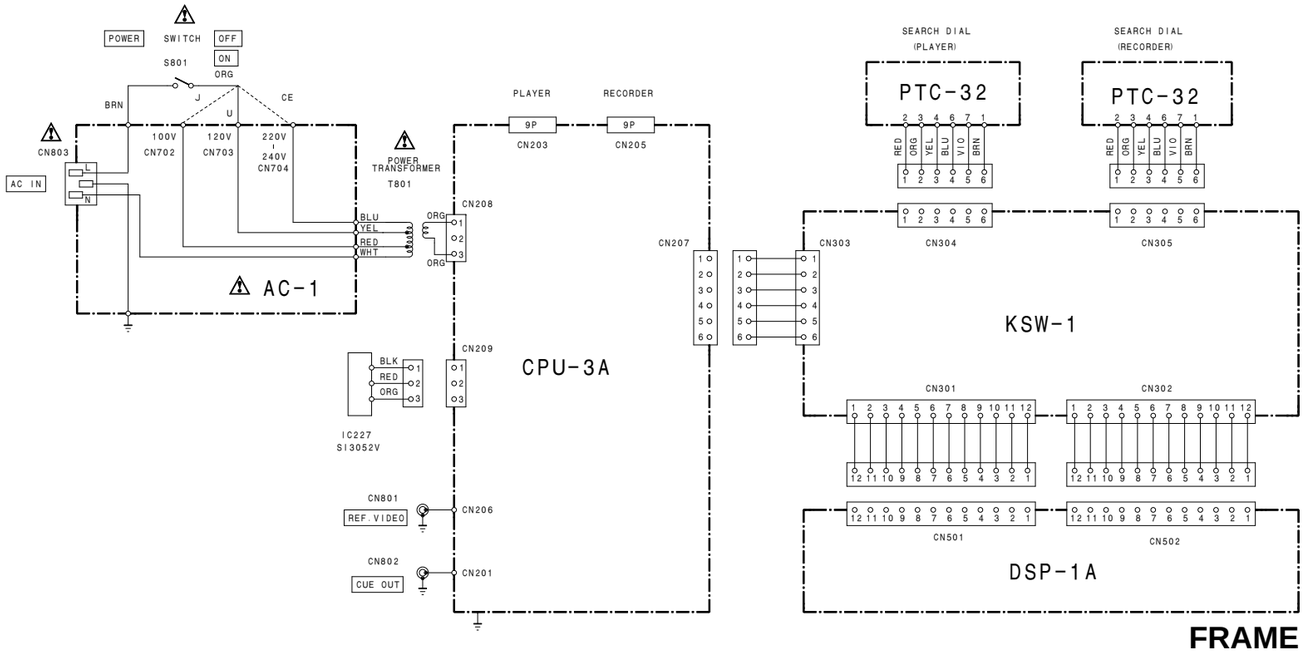
SECTION 6
DIAGRAMS

6-1. BLOCK DIAGRAM



OVERALL
B-RM450-BLOCK

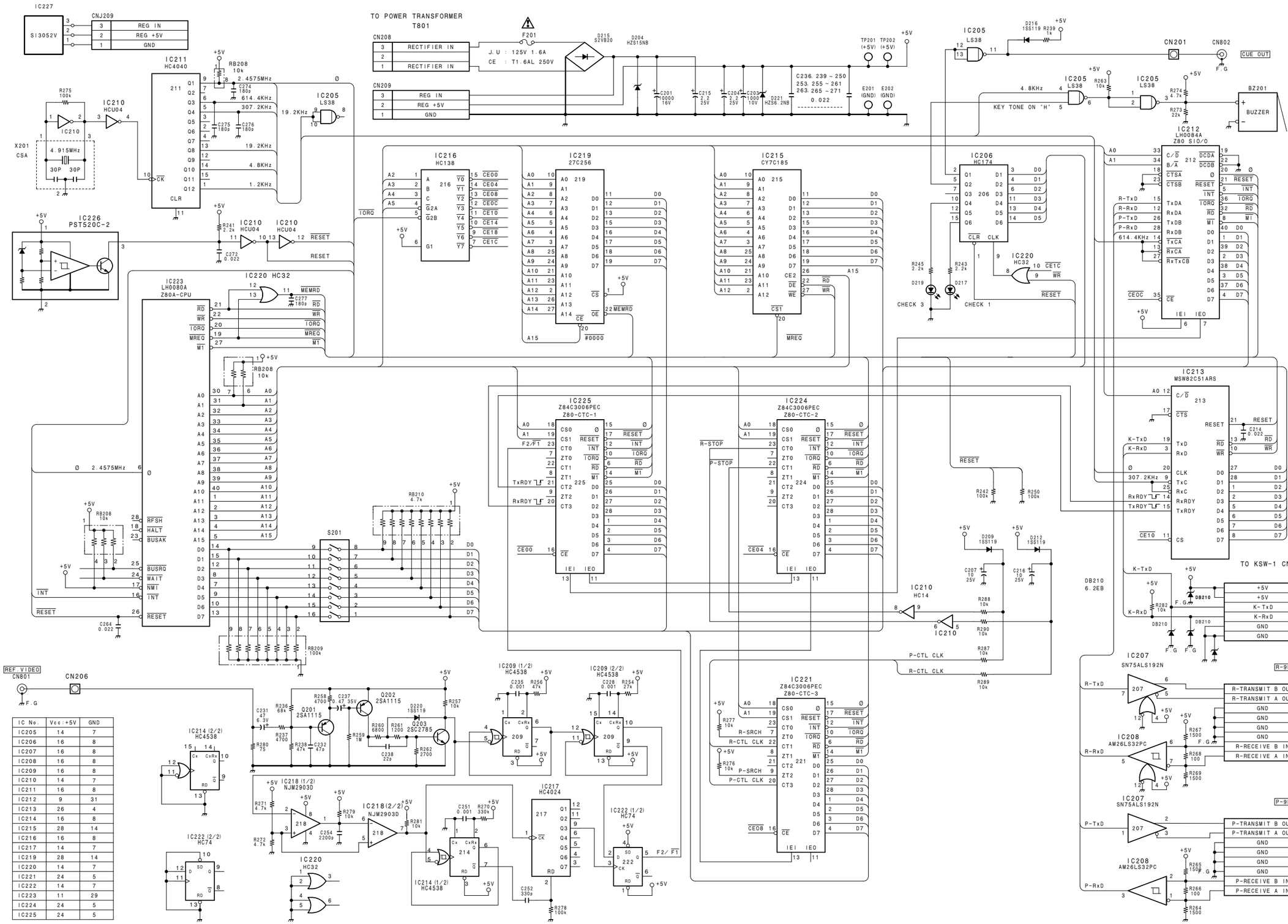
6-2. FRAME



FRAME

B-RM450-FRAME

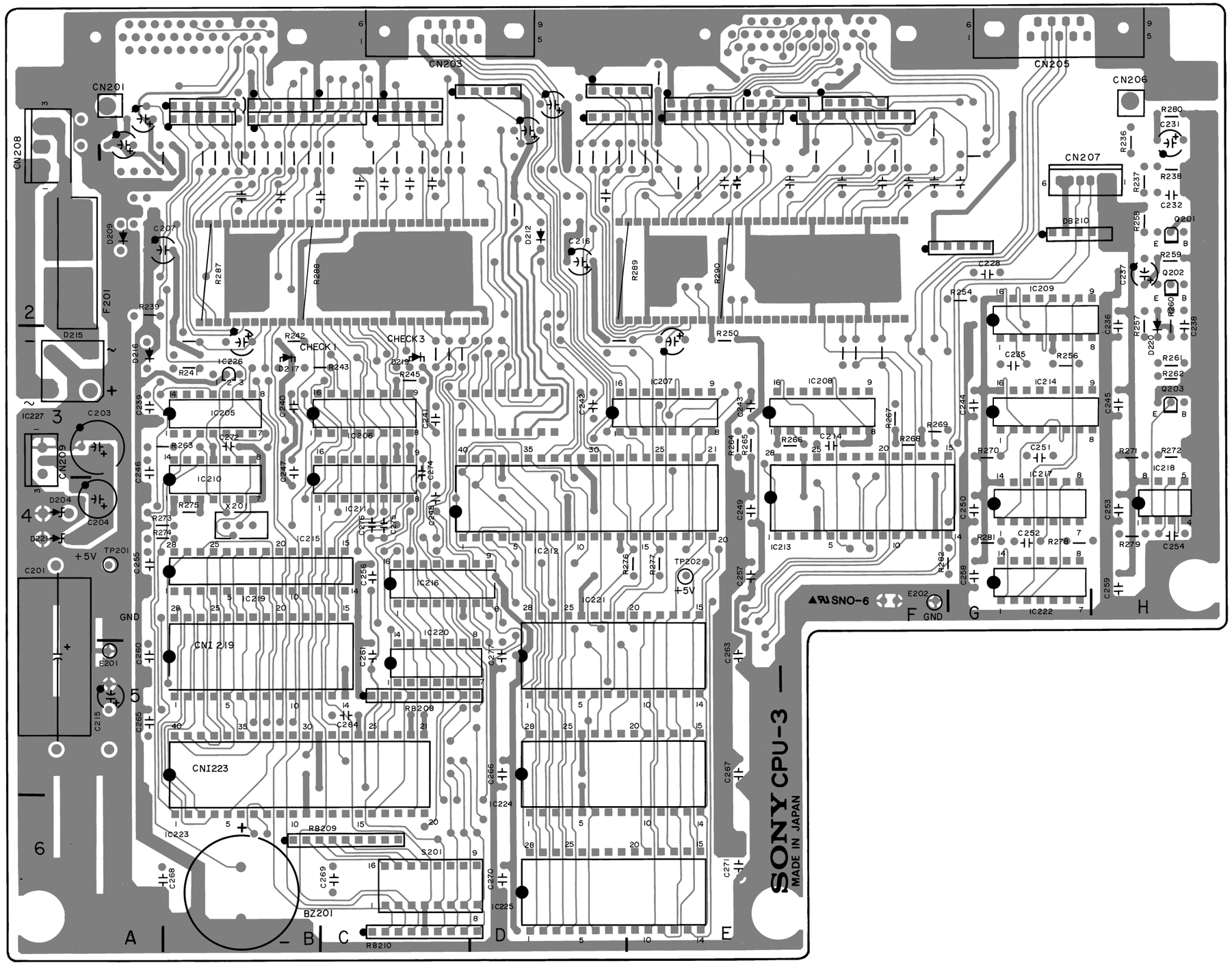
6-3. BOARD LAYOUTS AND SCHEMATIC DIAGRAMS



IC No.	Vcc:+5V	GND
IC205	14	7
IC206	16	8
IC207	16	8
IC208	16	8
IC209	16	8
IC210	14	7
IC211	16	8
IC212	9	31
IC213	26	4
IC214	16	8
IC215	28	14
IC216	16	8
IC217	14	7
IC219	28	14
IC220	14	7
IC221	24	5
IC222	14	7
IC223	11	29
IC224	24	5
IC225	24	5

CPU-3A
B-RM450-CPU3-SM

RM-450A



BZ201 B-6

CN203 C-1
CN205 G-1
CN206 H-1
CN207 G-1
CN208 A-1
CN209 A-3

CN219 B-5
CN223 B-5

D204 A-4
D209 A-2
D212 D-1
D215 A-3
D216 A-3
D217 B-3
D219 C-3
D220 H-2
D221 A-4

DB210 G-2

E201 A-5
E202 F-4

F201 A-2

IC205 B-3
IC206 C-3
IC207 E-3
IC208 F-3
IC209 G-2
IC210 B-4
IC211 C-4
IC212 D-4
IC213 F-4
IC214 G-3
IC215 B-4
IC216 C-4
IC217 G-4
IC218 H-4
IC219 B-5
IC220 C-5
IC221 D-5
IC222 G-4
IC223 B-5
IC224 D-5
IC225 D-6
IC226 B-3
IC227...(CN209)

Q201 H-2
Q202 H-2
Q203 H-3

RB208 C-5
RB209 C-6
RB210 C-6

S201 C-6

TP201 A-4
TP202 E-4

X201 B-4

CPU-3A - A SIDE -
1-625-668-13

RM-450A

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BZ201 B-6

CN203 C-1
CN205 G-1
CN206 H-1
CN207 G-1
CN208 A-1
CN209 A-3

CN219 B-5
CN223 B-5

D204 A-4
D209 A-2
D212 D-1
D215 A-3
D216 A-3
D217 B-3
D219 C-3
D220 H-2
D221 A-4

DB210 G-2

E201 A-5
E202 F-4

F201 A-2

IC205 B-3
IC206 C-3
IC207 E-3
IC208 F-3
IC209 G-2
IC210 B-4
IC211 C-4
IC212 D-4
IC213 F-4
IC214 G-3
IC215 B-4
IC216 C-4
IC217 G-4
IC218 H-4
IC219 B-5
IC220 C-5
IC221 D-5
IC222 G-4
IC223 B-5
IC224 D-5
IC225 D-6
IC226 B-3
IC227...(CN209)

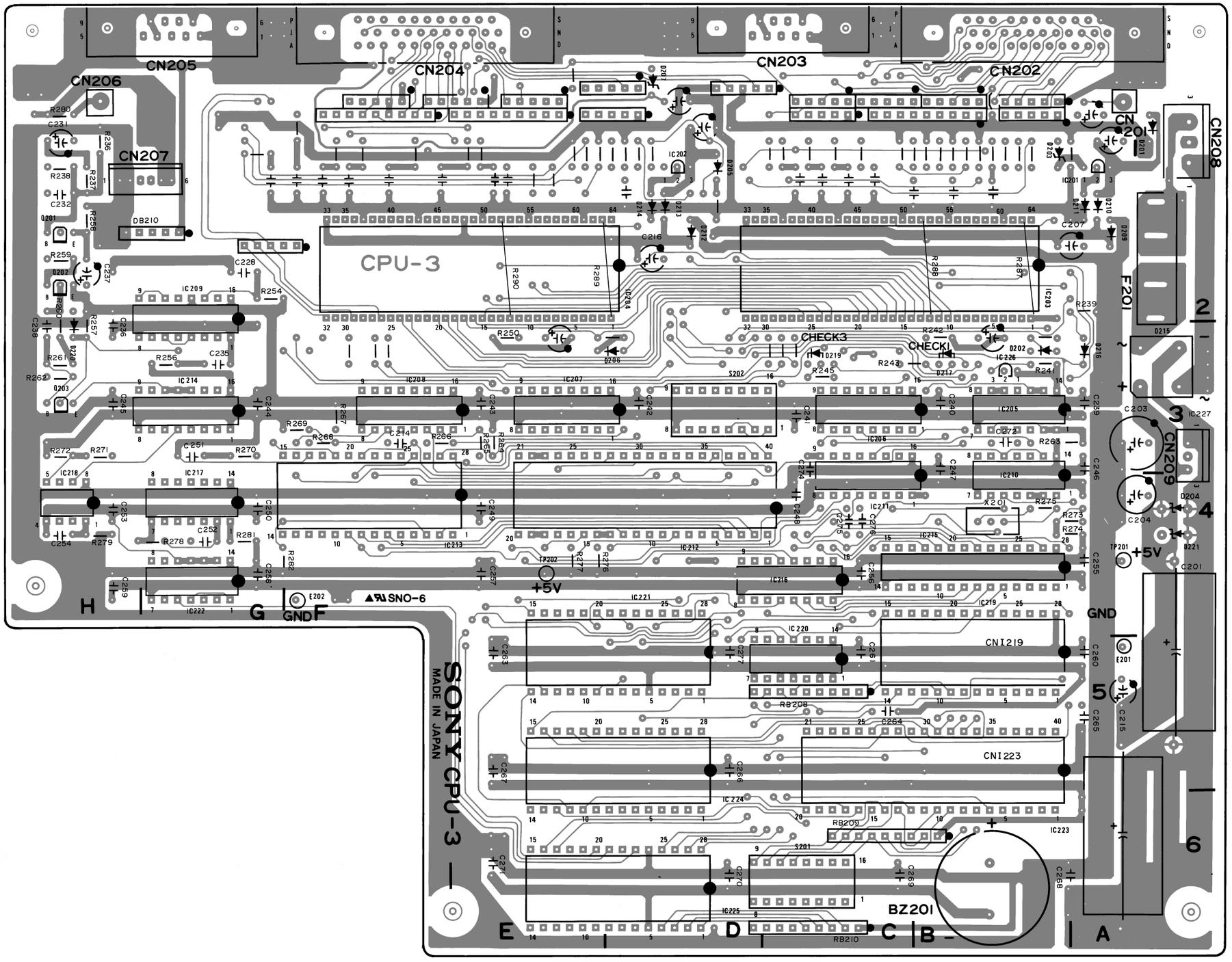
Q201 H-2
Q202 H-2
Q203 H-3

RB208 C-5
RB209 C-6
RB210 C-6

S201 C-6

TP201 A-4
TP202 E-4

X201 B-4



CPU-3A - B SIDE -
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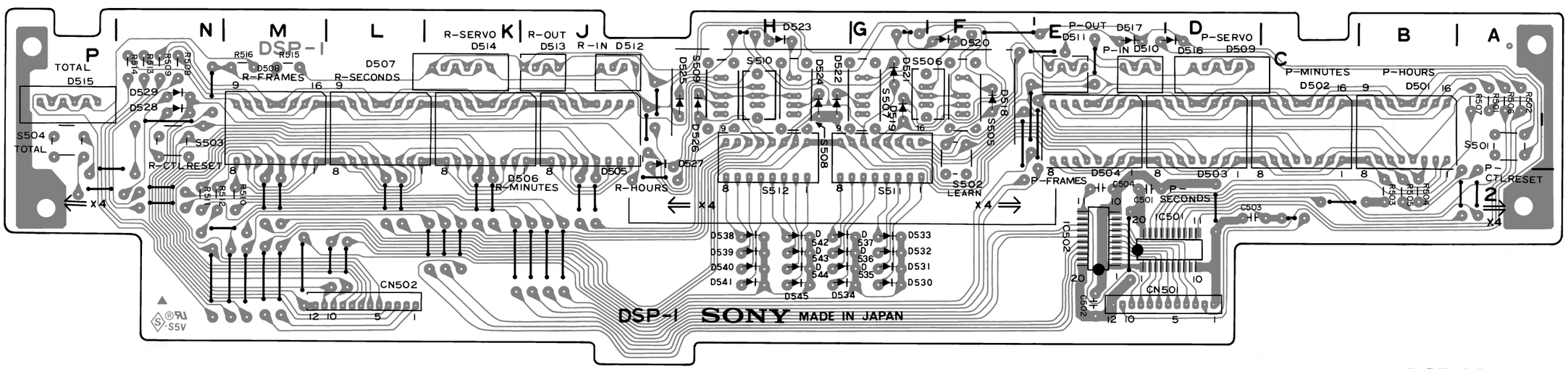
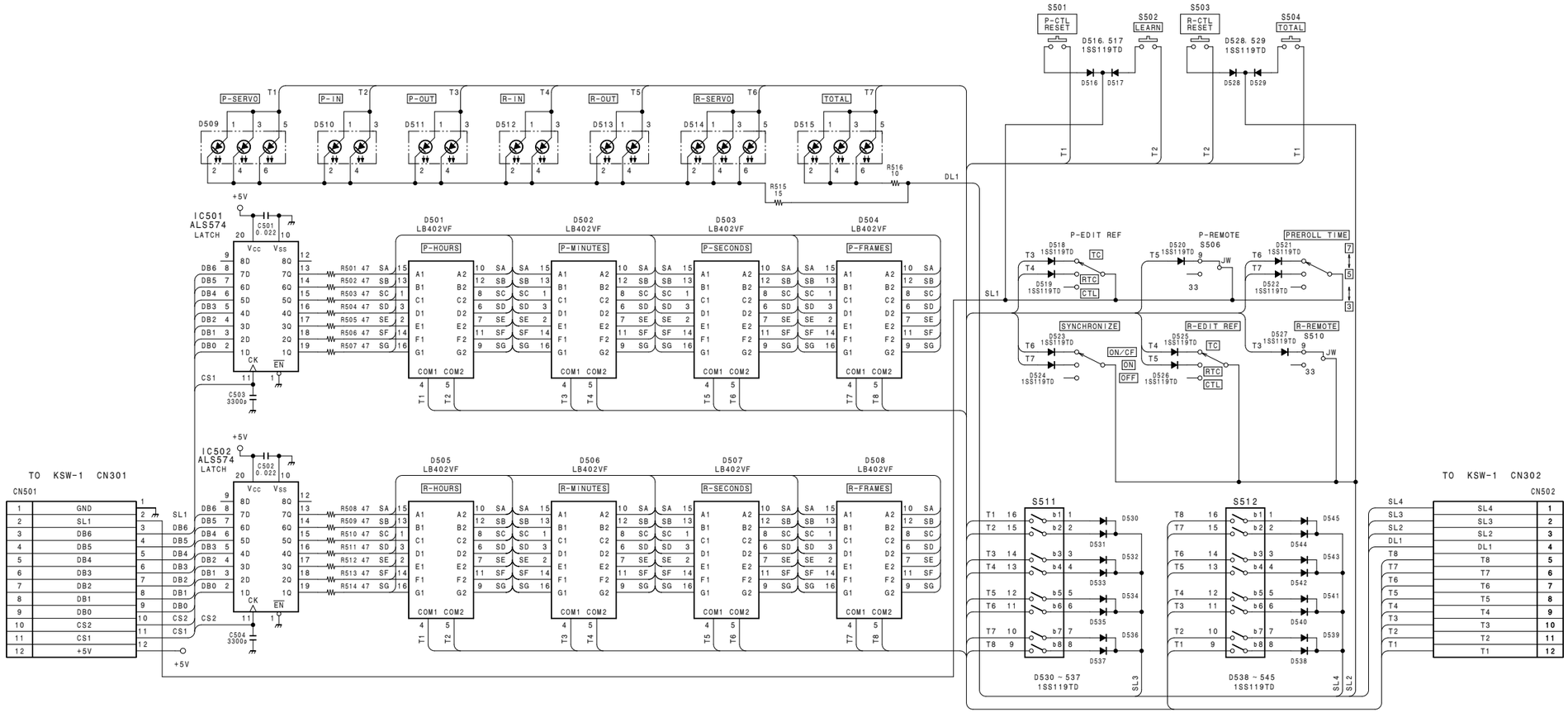
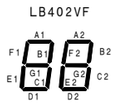


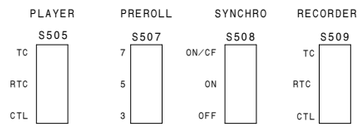
DSP-1A - B SIDE -

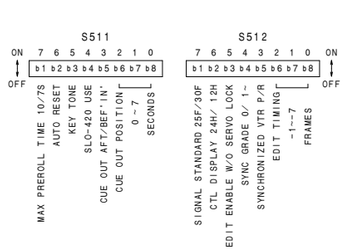
1-625-670-13

CN501	D-2	D529	N-1
CN502	L-2	D530	G-2
		D531	G-2
D501	B-1	D532	G-2
D502	C-1	D533	G-2
D503	D-1	D534	H-2
D504	E-1	D535	H-2
D505	J-1	D536	H-2
D506	K-1	D537	H-2
D507	L-1	D538	H-2
D508	M-1	D539	H-2
D509	D-1	D540	H-2
D510	E-1	D541	H-2
D511	E-1	D542	H-2
D512	J-1	D543	H-2
D513	J-1	D544	H-2
D514	K-1	D545	H-2
D515	P-1		
D516	D-1	IC501	E-2
D517	E-1	IC502	E-2
D518	F-1		
D519	G-1	S501	A-1
D520	F-1	S502	F-1
D521	G-1	S503	N-1
D522	H-1	S504	P-1
D523	H-1	S505	F-1
D524	H-1	S507	G-1
D525	H-1	S508	H-1
D526	H-1	S509	H-1
D527	H-2	S511	G-1
D528	N-1	S512	H-1









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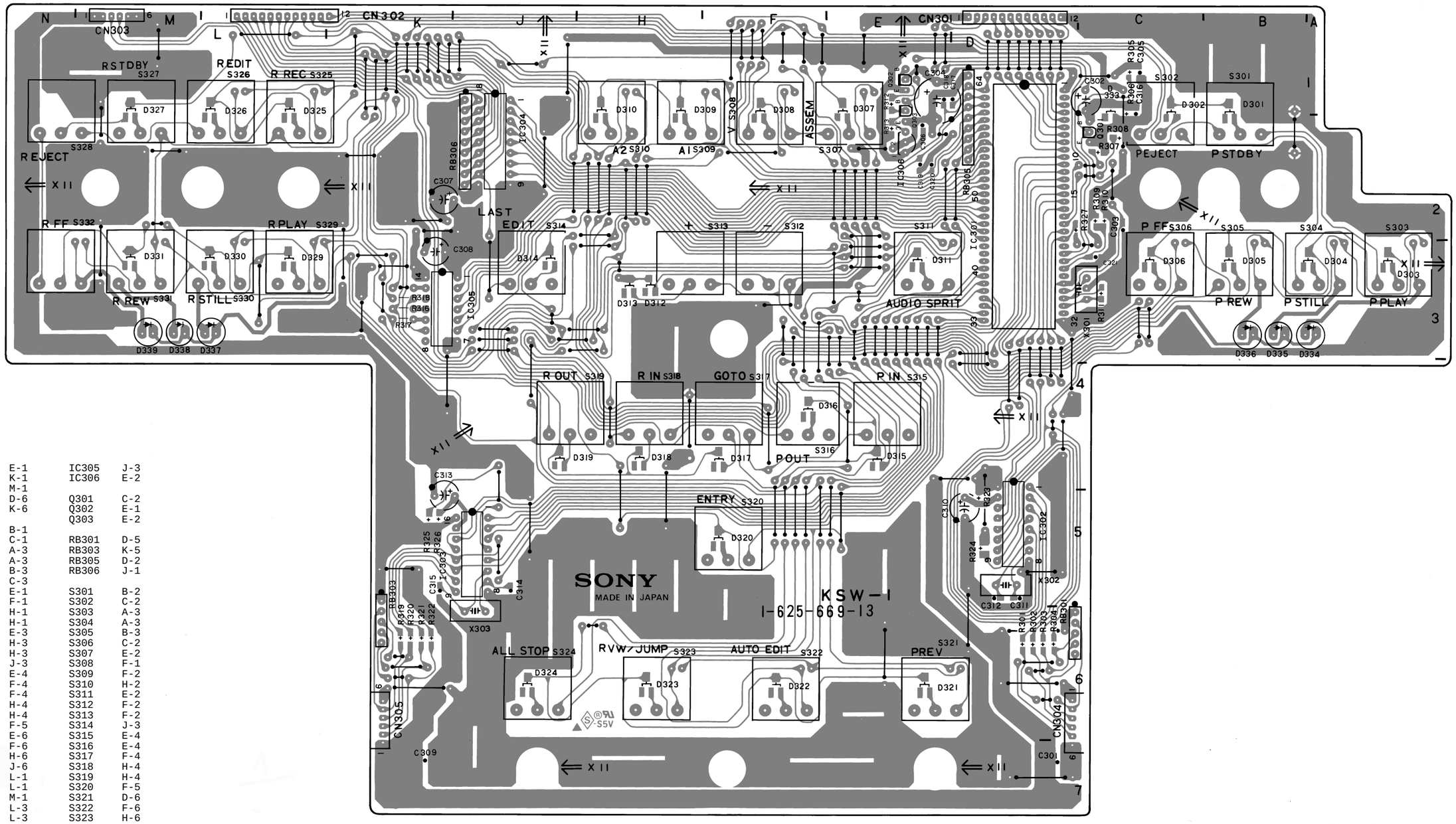

CN301	E-1	IC305	J-3
CN302	K-1	IC306	E-2
CN303	M-1		
CN304	D-6	Q301	C-2
CN305	K-6	Q302	E-1
		Q303	E-2
D301	B-1		
D302	C-1	RB301	D-5
D303	A-3	RB303	K-5
D304	A-3	RB305	D-2
D305	B-3	RB306	J-1
D306	C-3		
D307	E-1	S301	B-2
D308	F-1	S302	C-2
D309	H-1	S303	A-3
D310	H-1	S304	A-3
D311	E-3	S305	B-3
D312	H-3	S306	C-2
D313	H-3	S307	E-2
D314	J-3	S308	F-1
D315	E-4	S309	F-2
D316	F-4	S310	H-2
D317	F-4	S311	E-2
D318	H-4	S312	F-2
D319	H-4	S313	F-2
D320	F-5	S314	J-3
D321	E-6	S315	E-4
D322	F-6	S316	E-4
D323	H-6	S317	F-4
D324	J-6	S318	H-4
D325	L-1	S319	H-4
D326	L-1	S320	F-5
D327	M-1	S321	D-6
D329	L-3	S322	F-6
D330	L-3	S323	H-6
D331	M-3	S324	J-6
D333	C-1	S325	L-1
D334	A-3	S326	L-1
D335	B-3	S327	M-1
D336	B-3	S328	N-2
D337	L-3	S329	K-2
D338	M-3	S330	L-3
D339	M-3	S331	M-3
		S332	M-2
IC301	D-2		
IC302	D-5	X301	C-3
IC303	K-5	X302	D-5
IC304	J-2	X303	K-5

KSW-1 - B SIDE -
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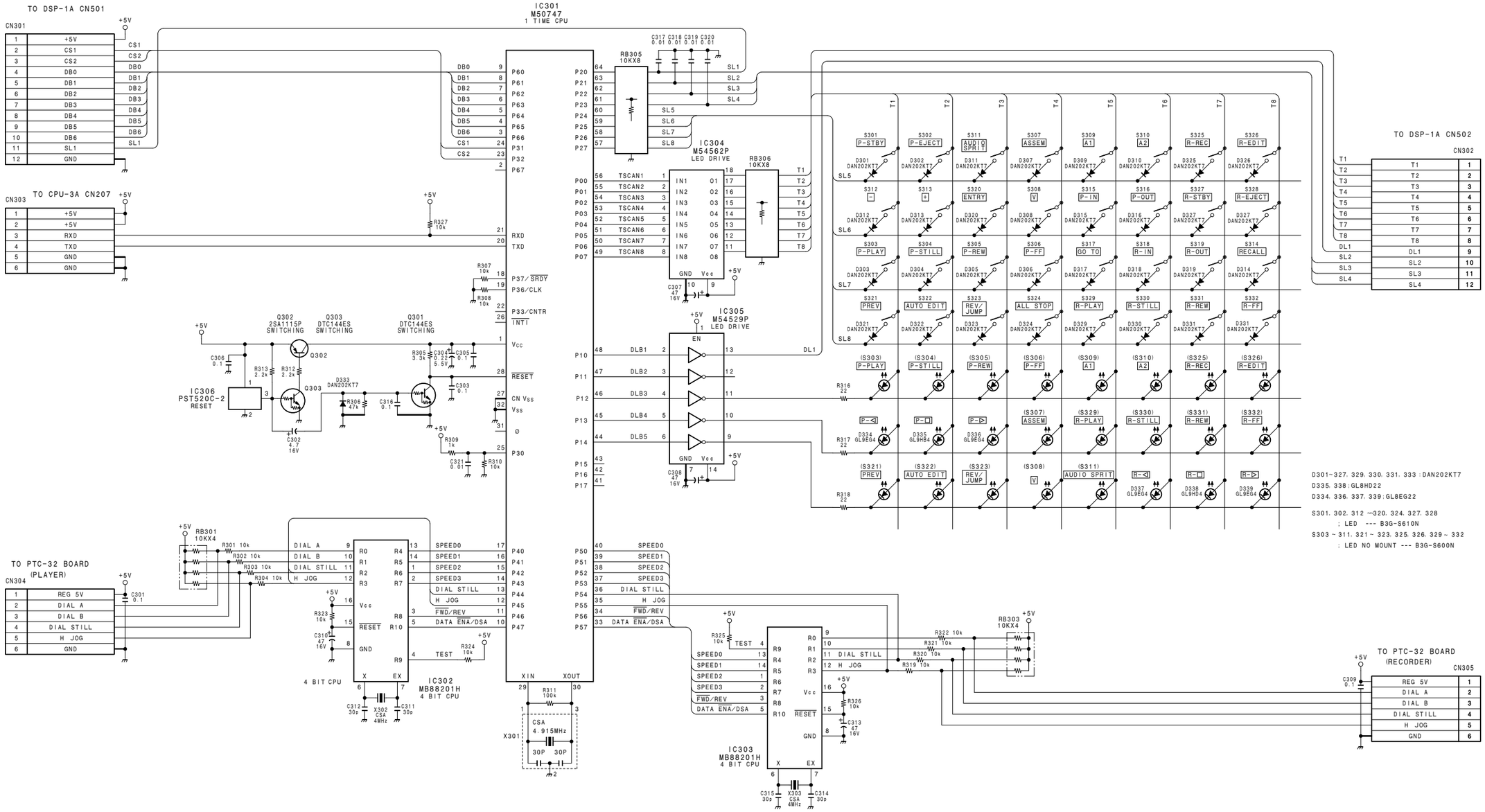
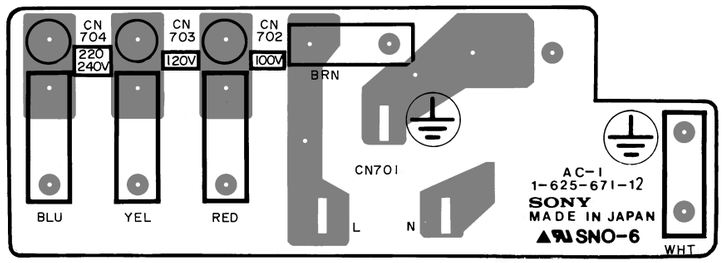


KSW-1

B-RM450-KSW1



AC-1 - A SIDE -
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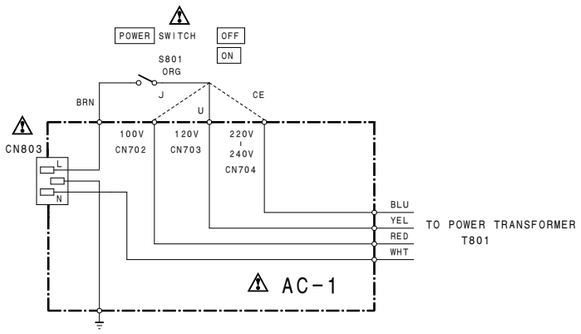
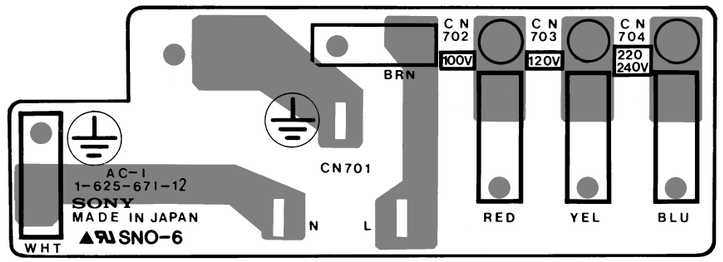


AC-1
B-RM450-PTC32-SM



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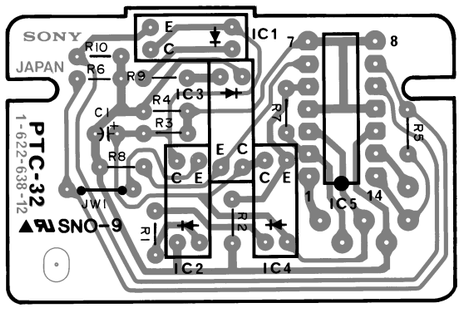

PTC-32 - B SIDE -
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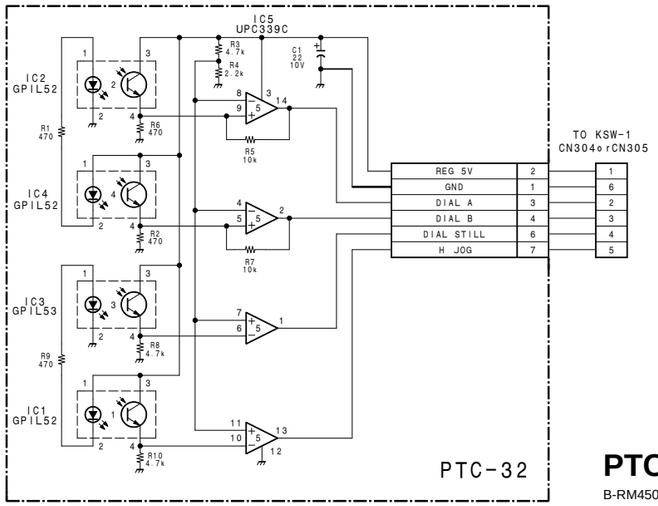

PTC-32
B-RM450-PTC32-SM

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